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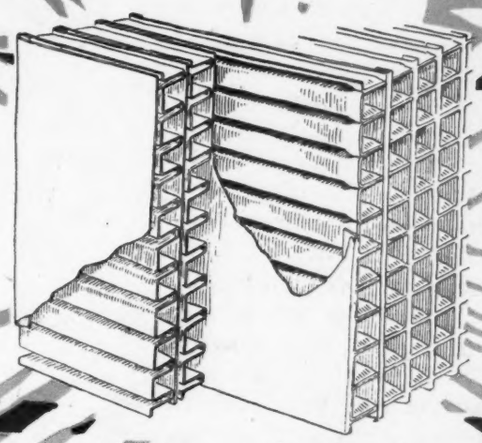
MOTOR AGE

VOLUME XXI

CHICAGO, JANUARY 11, 1912

NUMBER 2



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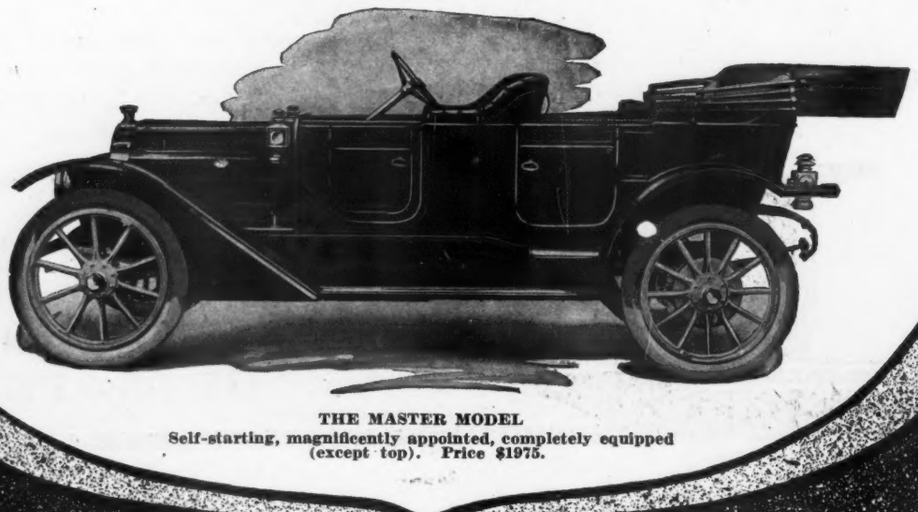

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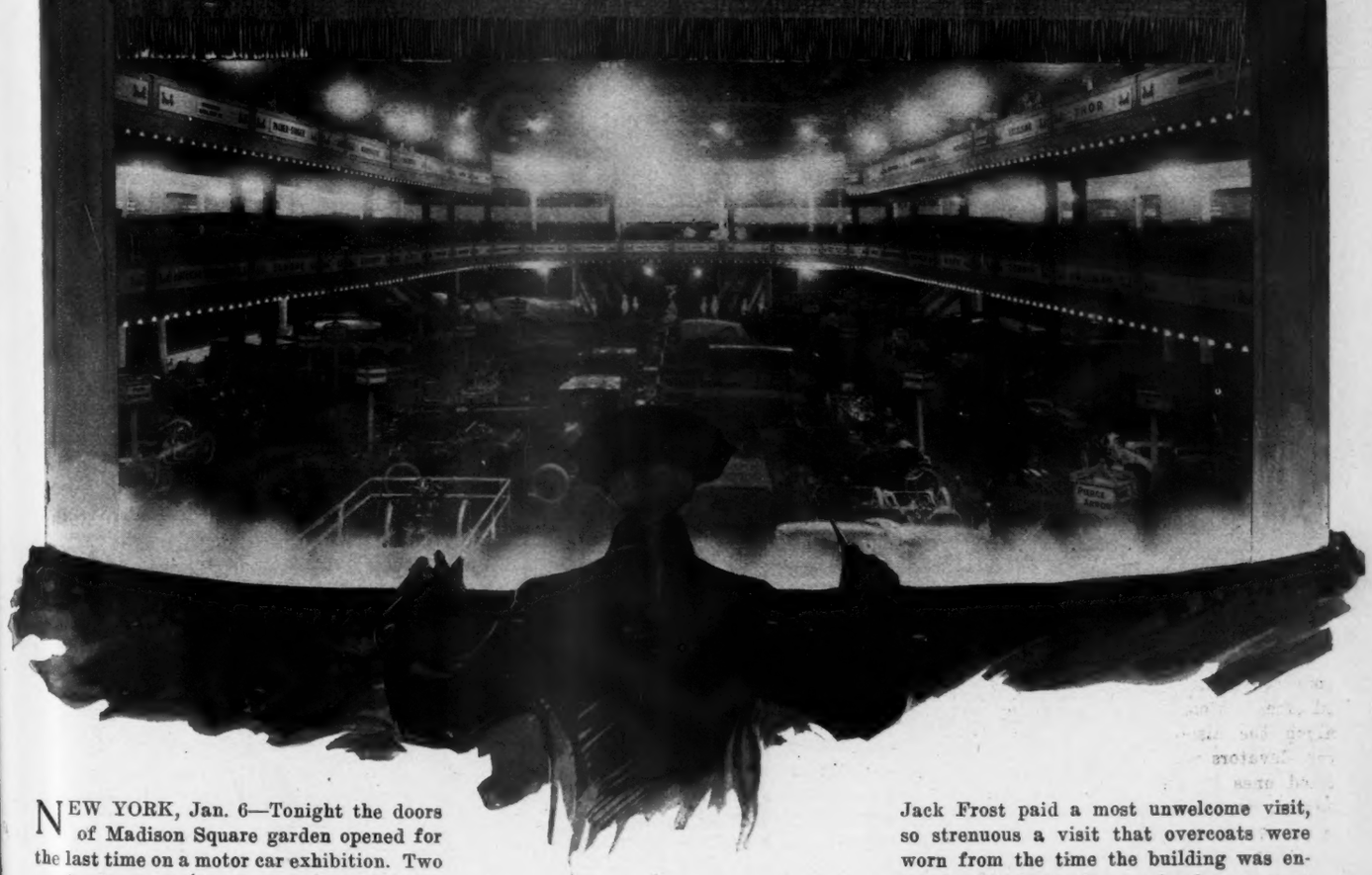
VOL. XXI, No. 2 CHICAGO, JANUARY 11, 1912 $3.00 PER YEAR

MOTOR AGE

The GARDEN SHOW OPENS



First Night of Automobile Board of Trade Show Marred by Cold—Decorations Subordinated in favor of the Cars—Left-hand Drive and Center Control Some of the Features—Trend of Construction—Lay-out of the Many Exhibits

NEW YORK, Jan. 6—Tonight the doors of Madison Square garden opened for the last time on a motor car exhibition. Two weeks from tonight these same doors will close for the last time to such a show. This historic amphitheater, which has housed more than a dozen big exhibitions, and which has associated itself so closely with the development of the industry, will be torn down before another cycle of time marks the opening of the show period, and when that time comes down new arenas will be provided, and the old haunts of Madison square will be known no longer.

Tonight's opening, although the last in this time-honored pile, was not any different from former openings, excepting that Jack Frost paid a most unwelcome visit, so strenuous a visit that overcoats were worn from the time the building was entered until closing hour and salesmen were forced to get their wraps before half of the evening was gone. Rarely has New York been treated to anything so severe a show time. It is generally Chicago's lot to be whipped around at the caprices of the weather man.

It was just 8 minutes after 8 tonight when to the strains of the Star Spangled Banner, played by the band in the top gallery, that the Madison garden doors were thrown open to the expectant crowd that shivered and stamped on the sidewalk. Many refused to wait outside. Some who came in taxicabs sat in the cabs until

LOOKING DOWN ON THE MAIN EXHIBIT FROM ONE OF THE BALCONIES

the doors opened and others sought shelter in some of the nearby hotels. It was anything but an auspicious opening for the last time of this home of the motor car exhibition in America.

Activity in the Garden

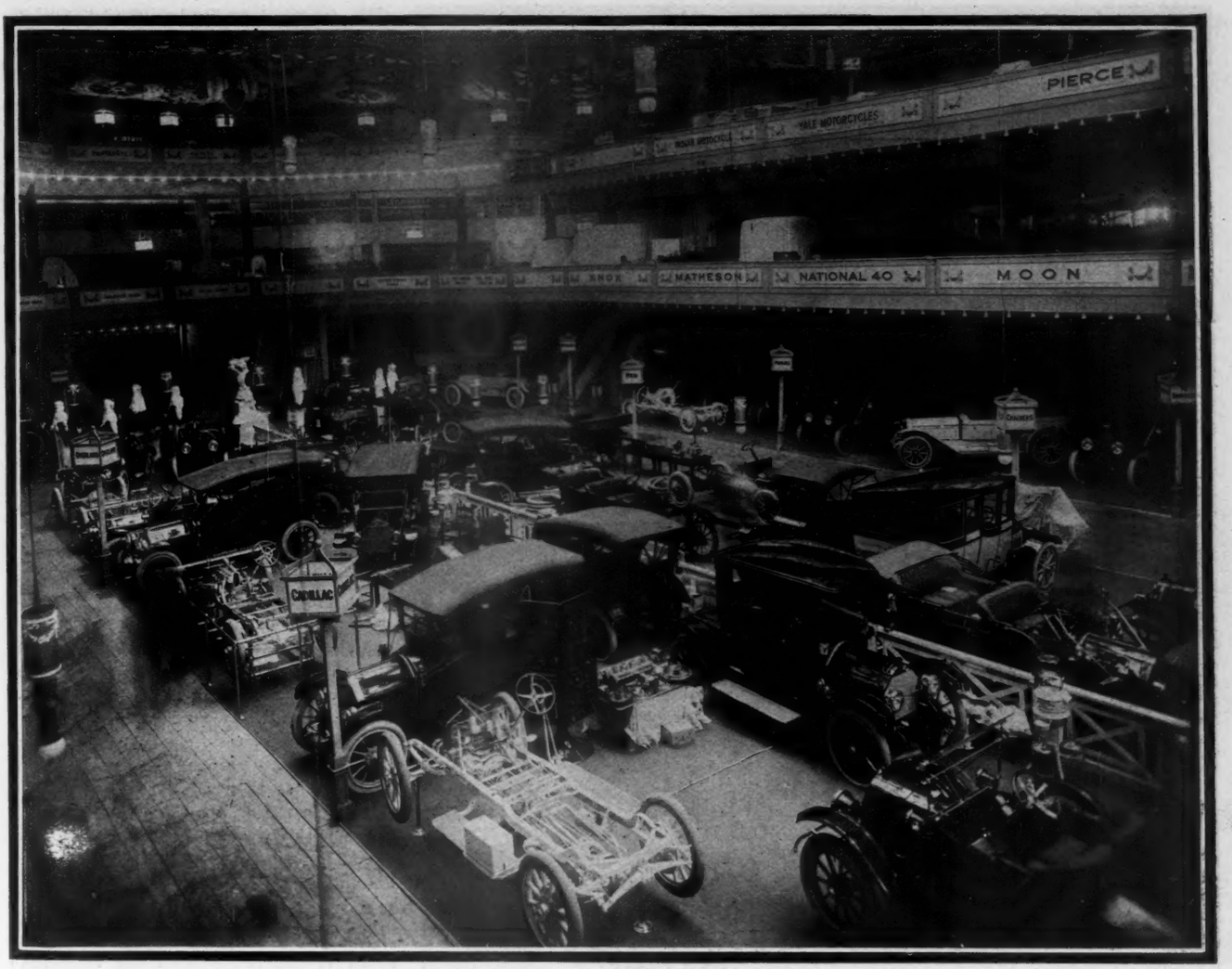
Inside the garden before the opening hour the usual activity was raging. Until after 7 o'clock cars were being pushed along the aisles to the exhibit spaces; the elevators were lifting some of the belated ones to the second and third balconies; workmen were changing the old A. L. A. M. signs to keep pace with the change of management; accessory exhibitors were carrying their boxes along the aisles; armies of sweepers were working on every floor; carpenters were swinging the stairs leading to the balconies into position; tarpaulins were being hurriedly pulled off show bodies; the polishers were putting the last glitter on the polished chassis; exhibit heads were trying to rearrange the cars to get a more dynamic exhibit; and, in fact, it was activity everywhere and all the time. Press and other spectators from the upper galleries shook their heads; the garden could not possibly be gotten ready by the opening hour; other lamented that there should be a delay in opening on the last show, and others, peeping through the upturned collars of their overcoats, hustled up to the press room, which was the only habitable portion of the garden at the opening hour. But in spite of all the apprehensions and forebodings the show committee once more made good. Colonel Pope had the situation entirely in hand and although the weather was contrary, the last touch was done, the doors swung open and the new automatic metal ticket sellers started doing business.

The garden rapidly filled with spectators—the same class of spectator that has been at the opening night for the last 10 years. Although first night is generally dubbed paper night, yet there is always a big paid following and Secretary Downs announced that the total attendance was slightly over 11,000, which is scarcely 1,000 lower than opening night a year ago. This was most favorable considering that the weather was so cold that sidewalk newsdealers were forced to close their stands during the early evening hours.

The attendance lacked that brilliancy of former years due to the general scurry to overcoats and wraps. Society people went about muffled up as if on street parade; the devotee who came to look into the insides of the chassis kept his coat collar up around his ears, and the few enthusiasts who ventured to lay coats and hats aside soon realized the folly of their ways. Nobody yet seems to know exactly why it was so cold inside the garden. Apparently the furnaces were not adequate for the exigency, chiefly due to the doors being open so much during the day, to allow the exhibits to be brought into the building.

Decorations Not the Whole Show

This year's show is not so beautiful a one as last season. It is a more business-like show, a show in which the decorations are secondary, the car being the major attraction. There were years when the spectators stepped inside the garden and then blocked the aisles gazing ceilingward at the long lines of statuary, the traceries, the brilliant lights and the signs. Not so tonight. It was more of a car show. Once inside everybody gazed upwards to see the huge oriental rug that had been talked about for so many weeks. It is the keystone of the decoration scheme, in fact, is about the only part of it. The garden is a huge ampitheater—an oblong building



MADISON SQUARE GARDEN AS IT LOOKS DURING THE SHOW WEEK

with two huge balconies extending around the two sides and the two ends. The faces of the galleries are severely plain, carrying but the names of the exhibitors. The entire ceiling is covered by the rug, which is far from being an oriental rug in reality, but a good imitation when viewed from the floor. It is a gigantic tracery effect, built around a mammoth wheel design in the center. A couple of allegorical figures extend from the center towards each end and all of the other space is a combination of square and diamond-shaped design, in oriental colors. Well beneath it hang the circles of electric lights which add the necessary touch.

Show Places in Garden

To the person not familiar with the garden it must be remembered that in addition to this mammoth amphitheater with its galleries there are three other show spaces; one is a large oval-shaped basement, with a couple of cross aisles; another a square exhibition hall which accommodates six car makers; and the third is a similar shaped room known as the restaurant and which is given over to accessory exhibitors.

The cars, gasoline and electric, occupy the entire main floor, three sides of the first gallery and two sides of the second gallery, and the exhibition hall. The motor cycles occupy part of one side of the second gallery; and all that remains goes to the multitude of accessories.

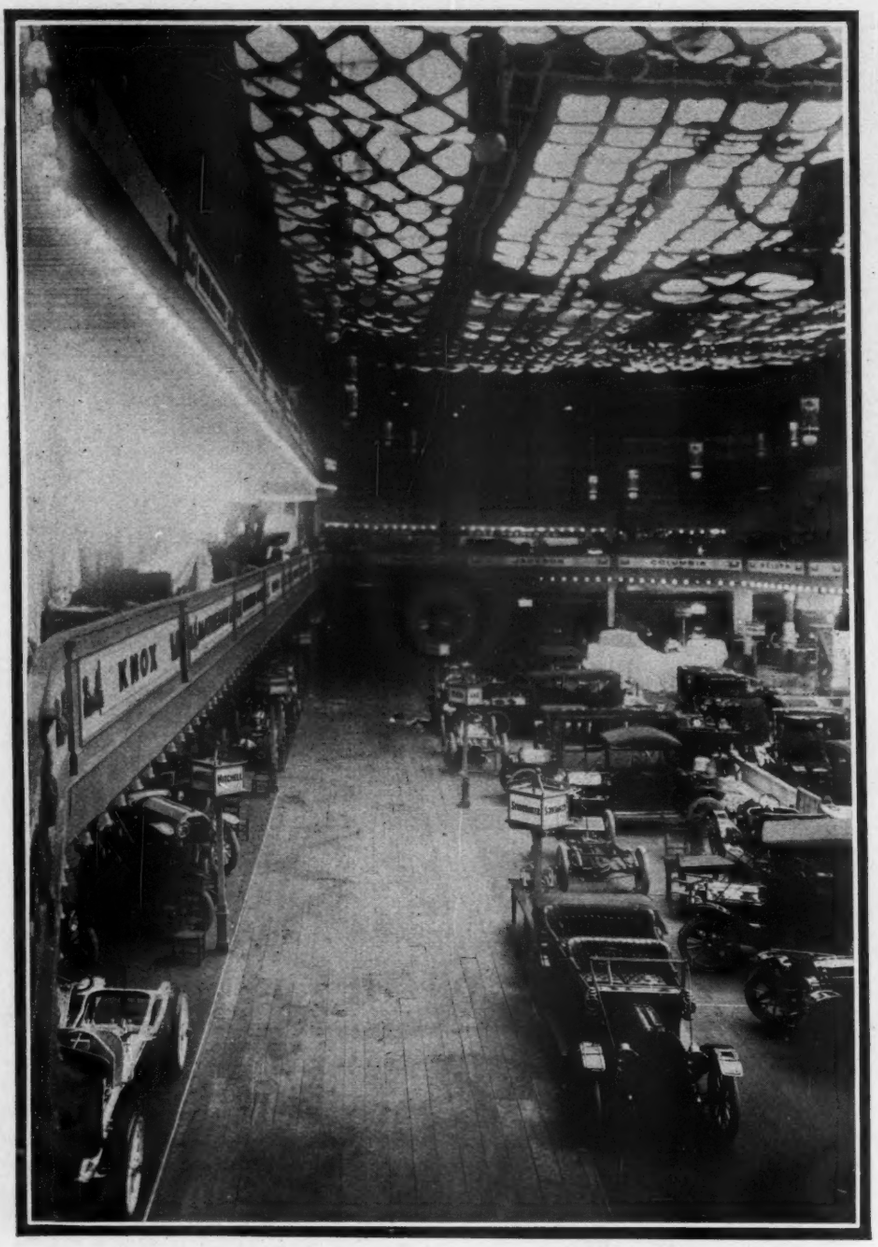
The main floor of the garden, a huge rectangle, has an oval-shaped aisle, with two rows of exhibitors inside of the oval and another row outside of the aisle and backing up against the wall. The assignment of space was according to value of car output during the last fiscal year, those companies with the biggest output having the choice of space, consequently many small car makers are found mixed up with the high-priced cars in the central oval. Buick and Studebaker occupy the coveted positions, with Overland and Reo next in line. Other medium-priced cars are Chalmers, Hudson, Cadillac and Maxwell. Among the big car makers are Packard and Pierce-Arrow. In the outer circle are Oldsmobile, Stevens-Duryea, Mitchell, Peerless, Locomobile, Winton, Lozier, Stearns, Stoddard, White, Franklin, Oakland and Pope.

The first balcony is a huge oval made possible by the use of a mass of steel construction work, which the show management uses each season. In early days the balcony was scarcely big enough to accommodate a car, but by the use of thousands of tons of steel girders and pillars the balcony is wide enough to have a central aisle, with the cars on the side fronting the face of the balcony and the accessories between the aisle and the wall. The show spaces for cars are as large as those on the main floor. There are twenty concerns showing here, the names being Selden, Columbia, Jackson, Brush, Haynes, Pullman, Corbin, Moon, National, Matheson, Knox, Marmon, Thomas, American, Everitt, Elmore, Alco, Moline and Premier.

In the Second Balcony

On the second balcony, only one side and one end are given over to cars, the makes shown including Garford, Ohio, Speedwell, Marquette, Palmer and Singer, Atlas, S. G. V. and the following electrics: Waverley, Anderson, Baker, Flanders and Grinnell. The layout is the same as in the first balcony and the exhibit spaces as large.

In the exhibition hall, which is a square room on the ground floor immediately at the right when entering are six car



LEFT SIDE OF GARDEN ON ENTERING, SHOWING TWO BALCONIES

makers, Inter-State, Simplex, Mercer, Amplex, Case and Cartercar.

The accessory exhibits are in four different spaces, two ovals around the walls on the first and second balconies, the oval space in the basement and the rectangular space in the restaurant.

When numerically considered the show is a giant of no mean stature: There are ninety-four exhibitors of motor cars, 500 exhibitors of accessories and twenty motor cycle firms. To house these varied exhibits has called for 125,000 square feet of floor space, every foot of which is utilized to advantage. The aisles are of good width and the anti-smoking rule helps out in making for the comfort of spectators.

While the building, the decorations and the crowds attending play their parts, it is nevertheless the cars and the accessories that the people want to see. No sooner are they inside than they start a pilgrimage. Some go direct to exhibit spaces, perhaps a space where they have to meet a salesman by appointment. Others, more bent on a general study of the show, go about in a consecutive manner.

Trend of the Show

Looking over the exhibits of cars, it is surprising to see the number of left-hand drive cars. The growth has been almost as rapid within the last few months as has been that of self-starters. A year ago everybody looked for a few cars with steering wheels on the left-hand side, but few anticipated a landslide. The big car is taking up the idea. The Lozier berline limousine marks the entry of this company into the left-hand field, this model having central control levers. Easy access at the right side is possible by the wide door, which when open exposes more than one-half of the end of the front seat. The Stoddard company shows a berline type with the Knight motor and steering wheel on the left with central levers. On the six-cylinder White touring car, exhibited for the first time, the steering wheel is on the left with a change-speed lever in the center, and the brake lever on the left side. This model is equipped with the new electric White self-starter.

The National company has cast its lot with the left-hand control people, showing it in two models, the central position of the levers being used in each. A part of the exhibit is also made up of a gearset unit showing the compact method of mounting the change-speed and brake levers on the gearbox. The Matheson people, while continuing to place the steering wheel on the right side, have positioned the two control levers in the middle. In the Knox space are two cars with the steering wheel on the left side, one a berline limousine with a sheet aluminum body finished in rosewood. It is made with arched doors and is one of the show vehicles of the exhibition. On this, and also on a touring car with left-hand wheel, the levers are placed in the center. An interesting novelty on this car is mounting the speedometer, clock, and oil gauge in the sloping reverse face of the cowl dash so that they are at an angle of 45 degrees to the driver. Reo shows its new model with one control lever and two pedals. The emergency brake lever has been discontinued.

Some Inclosed Body Types

The point of interest in the Cadillac space is the coupe with the right-hand control. The driver's seat tilts backward, thereby leaving a space for easy entrance and exit, and making it possible to stop with the right side to the curb, and having the same convenience as in a left-hand control. The Oldsmobile coupe is the only car of this make shown with the steering wheel on the left side and central levers. A novelty is a small folding seat against the right half of the dash, making the vehicle a comfortable three-passenger one. This folding seat gives a touch of electric carriage work construction to the vehicle. A talking point on the four-cylinder Oldsmobile Autocrat is the fashioning of the cowl dash to incorporate the electric lights. The curved portion of the dash is given a semi-cylindrical formation at each side to accomplish this. The ventilators for this body are in the doors, and take the form of gills, the same as used in bonnets. In opposition to these ventilators is a warming grate in the floor. This consists of a series of perforations in the floor with a slide plate to cover or uncover as desired.

A feature in the body display at the show is the unit compartment type. A year ago it was expected that there would be many of these on the market, but these expectations have not been realized. There

are three conspicuous examples. The Marmon and Case in the gasoline field, and the Waverley in the electric field. In the Marmon the driver occupies an individual seat, with a folding seat at his left, and without any compartment between him and the rear seat. The construction of the Case is practically the same. Employing a unit design of this nature and fitting a folding seat beside the driver makes but two doors necessary, one to the front on the left, and the other centrally positioned on the right. Overlands all have right-hand control with center levers. The Marmon is a very sumptuously fitted body, with an attractive exterior. The Waverley electric differs considerably from others of its type by having an individual seat for the operator at the left side, leaving a full width seat in the rear.

It is almost impossible to draw many general conclusions as to body colors from show cars. Many of the cars are painted specially for exhibition purposes and are often repainted before being finally sold. In the color scheme every tint in the rainbow is represented. Premier shows a six-cylinder touring car in green and white. There is a Columbia-Knight with the color idea styled ashes of roses. An Alco touring car is finished in a cream shade, and so the story of relative color tints with upholstery to match can be carried throughout the entire show.

There are more than the usual number of chassis exhibited, and while more are shown there are fewer of the polished type seen. It is more popular to use white or colored enamels. The enameling is really a more practicable job. The six-cylinder Packard chassis is encircled by a heavy metal railing, and one or two other companies have taken similar precautions. The greatest chassis novelty of the show is the Flanders, which is cut in halves vertically and longitudinally. Looking at the cut surface all of the parts of the car in this plane are seen in section. The exhibit constitutes a very fascinating center. Another interesting exhibit is the Liberty Brush, mounted on a constantly moving turntable.

Cutaway Chassis Few

It is questionable if there are as many cutaway chassis as formerly. It is natural to expect that the different Knight types of motors would be demonstrated. Stearns has a particularly fine worked out cutaway motor driven by electric power. Every portion of the operating mechanism can be seen. Charles Y. Knight, the inventor of this motor, was an interested party in the space tonight, as well as in the spaces of the Stoddard-Dayton and Columbia, where cutaway motors are shown. In the Chalmers space the center of interest is the unit motor with its self starter, the self-starter being demonstrated constantly. Cadillac, Overland, Reo and Metheson show interesting exhibits.

The importance of the roadster cannot be missed in a visit to the garden. It is omnipresent. Many concerns are exhibiting them for the first time, and the body types are as up-to-date and attractive as many of them that have been annual visitors at the garden for several seasons. The roadster of this year is a comfortable creation. It has the seat well in advance of the rear axle; it has a heavily-cowled dash; it has foredoors, and from every viewpoint is an attractive vehicle. Carrying the spare tires on the rear, and using a large luggage trunk impresses the buyer with the touring possibilities of this vehicle.

New York shows have never been reputed as great retail selling affairs. In the earlier days long lists of sales were reported, but this custom has long since fallen into disuse. It is true that within an hour after opening, the usual number of sales were reported, but upon investigation it was generally discovered that these were really previous sales, some of them having been made to people in the cities where the cars are manufactured. There are some cases of new agents buying demonstrators. All in all it will be surprising if there are many retail sales made this year.

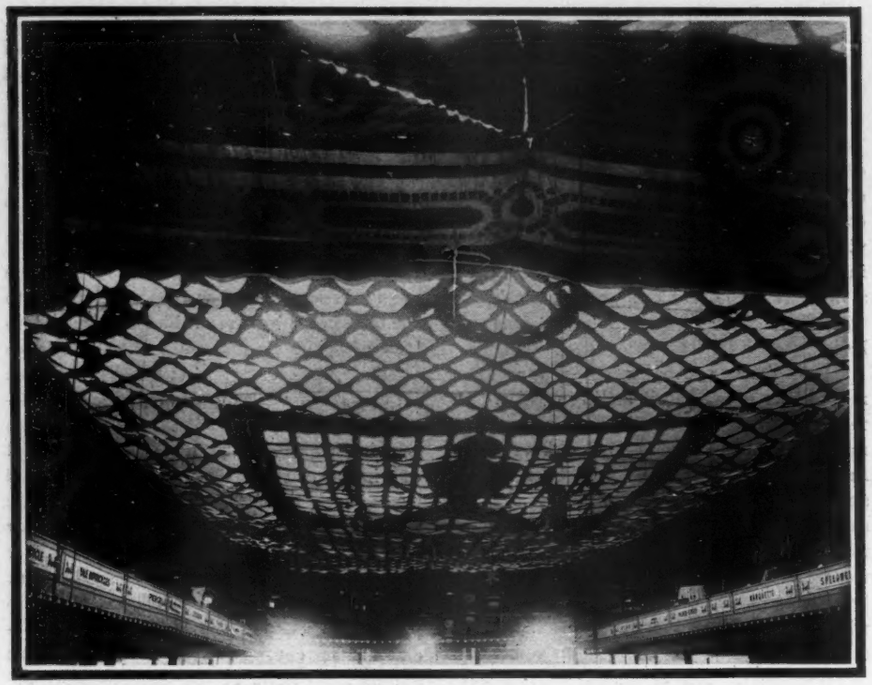
Attendance First Night

It is always impossible to state on opening night the exact attendance of dealers from different parts of the country. The show committee has had this matter in mind and expects the attendance of at least 5,000 dealers from all parts of the country. These dealers have all been written to and told that they will be given season passes to the show upon presentation of their credentials to the management. Already the nearby dealers are on hand, they being readily distinguished from the exhibitors by the blue metal badge which they wear, the exhibitor's badge being colored red. One reason why many of these arrived early was to take in the closing days of the Importers salon at the Astor.

Electric Car Tendencies

It would be incomplete to close a résumé of a national show without reference to the electric pleasure vehicles. Owing to lack of space they are not shown in large numbers, five concerns exhibiting. Three of these are old makers, and two are recruits of the year. The electric vehicle is going through a very perceptible period of improvement. The standard inclosed types, such as coupe and broughams, are continued, and to these are added roadster and unit compartment bodies. One maker has listed a palatial limousine, selling at $5,000 or over, which marks a new departure in this field. The new Flanders electric is characteristic because of the unique suspension of the body entirely between the axles, and carrying the battery beneath the body. The forward axle is several inches in advance of the front body line, and the rear axle occupies a similar position at the back, the result being that the utmost ease in riding should be accomplished. There is a perceptible trend also to the use of shaft drive, this being perhaps more apparent than a general survey of the electric field than in an analysis of the few makers represented. Motor Age purposes in its Chicago show

RIGHT AISLE ON MAIN FLOOR LOOKING TOWARD ENTRANCE



TURKISH RUG APPEARANCE OF THE GARDEN CEILING

number treating exhaustively of the electric machine in its various aspects.

In last week's issue of Motor Age the general technical trends of the industry were followed through the various car departments, and it would be needless repetition to again enumerate these various tendencies as seen at the show. There are, however, several interesting side lights which show the attention that is being given to the car in the matter of equipment and construction. At every booth is heard the story of more equipment as stock. The buyer should welcome this, because now when he buys a car he gets a vehicle which is in rational touring form. It has lamps, speedometer, horn, windshield, top, and in many cases an adequate supply of tools, and such necessaries as tire brackets, etc. This means that the buyer is freed from the torture of having to go through the entire acessory field to put his car in usable form. As a matter of fact, this entire trend is an economic advancement. The maker purchases in wholesale lots and is able to outfit cheaper than the individual, and the time of both is saved in the bargain.

Self-Starters Prominent

The place that self-starters is taking in the show cannot be overlooked. In every exhibit space where they are stocked as optional equipment they constitute the major topic of conversation. They are most prevalent on cars listed from $1,000 to $2,500, although they appear on cars selling in the highest classes. At present the explosive gas-type has an immense following, one argument for its popularity being its simplicity, and the further fact that the explosion of the gas in the cylinder warms the cylinder walls and prepares the way for the normal working of the motor. All of the other lines of starters have their following, namely compressed air, electric, and mechanical types consisting of springs, levers, etc. A leading argument advanced by the compressed air type enthusiast is that there is no strain placed on the crankshaft when starting, the rotation of the shaft being accomplished by the air pressure within the cylinder.

Hand in hand with self-starters is the problem of electric lighting. This is becoming one of the really big factors. Electric lighting outfits are being shown on many of the highest priced cars. In some cases the electric lighting generator serves for self-starting purposes also, but it cannot be definitely stated at present whether a generator which will furnish current for ignition, current for electric lights, and current for self-starting will be the eventual type or not. It is interesting to note the comments of spectators on this question. Some want the three-in-one variety because of its simplicity, and others do not want to run the chance of a trouble in the lighting system upsetting the ignition or self-starting features of the car. By the end of the year some definite trend will be noted in this field.

The electric lighting brigade has made much progress during the year. In the early part of last season there was more or less of the mushroom growth in several quarters. Generators of different types were hurriedly marketed. Some of these proved efficient on six-cylinder cars but were not adequate in four-cylinder types. Some of them were too bulky for installation on many of the motors. These troubles have largely been rectified, and not a few of the car makers are providing means for installing the generator on the crankcase. Those concerns which at present are installing a regular ignition magneto, and an electric light generator in addition are in some cases grouping these from the same side of the motor, and in some cases are mounting them on opposite sides. In many cases it is quite apparent that the addition of the electric light generator has been secondary. This is shown by the position on which it is mounted, and also by the exposed method of drive. A chain is the preferred type, but undoubtedly this will be changed inside of another season. It is also a fact that in several cases the location of the generator interferes considerably with the accessibility of the magneto. The correction of this is one of the problems of the year.

Other Lighting Tendencies

Closely associated with the illumination of the car is the progress that has been made in the development of devices for lighting acetylene lamps from the seat. There are many of these shown in the accessory department, and many are fitted to the cars. By the use of these devices the acetylene gas can be turned on and ignited in a single movement.

There are many other apparent improvements in the lighting field. Winton, for example, exihits all cars fitted with gas lamps entirely encased. Half a dozen other firms show one or two models similarly provided. Many novelties in lamps are noticed.

GARDEN STATUARY

Late News Items Gathered At Shows

Automobile Board of Trade Holds Annual Election and Returns All Its Old Officers—Accessory Organization Also Chooses Three New Directors—American Automobile Association Executive Committee Meets—Trade Happenings

NEW YORK, Jan. 9—Special telegram—Completing its first year of existence, the Automobile Board of Trade has just elected officers and made ready for entering upon a still broader field of usefulness. Without exception the incumbents of the various offices were chosen to fill them again. The roster of the organization reads as follows:

President, Charles Clifton; vice-president, Charles C. Hanch; treasurer, George Pope; secretary, Benjamin Briscoe. H. A. Bonnell was re-elected general manager.

The annual meeting which was held today at headquarters was devoted to perfunctory action only. The chief item of interest in the proceedings was the admission of the International Motor Co. to full membership. This company was formed last summer by the merger of the Mack and Saurer interests, having factories at Allentown, Pa., and Plainfield, N. J., respectively. Both plants will be operated as heretofore. The company was actually elected to membership in December but no announcement was made until after the executive committee of the board of trade met on Monday.

The committee assignments for the present year are as follows:

Patents—C. C. Hanch, W. H. Van Dervoort, L. H. Kittredge, A. MacAuley.
Legislation and law—G. H. Stilwell, Albert L. Pope.
Trade—H. O. Smith, E. R. Benson, W. E. Metzger, C. W. Churchill and W. T. White.
Intercourse and arbitration—G. E. Daniels, W. C. Shepherd, J. W. Gilson.
Good roads—R. D. Chapin, S. D. Waldon, J. N. Willys.
Statistical—Benjamin Briscoe, E. P. Chalfant, J. S. Clark.
Publicity—Alfred Reeves, E. R. Estep, H. W. Ford.
Show—George Pope, Alfred Reeves, M. L. Downs.
Mechanical co-operation—A. L. Riker, D. Ferguson, F. B. Stearns, C. W. Nash and H. E. Coffin.

The association is practically as large as the A. L. A. M. was at its his high water mark with the following cars represented by officers in the membership: Autocar, Buick, Brush, Cadillac, Cartercar, Chalmers, Columbia, Corbin, Cunningham, Courier, Elmore, Everitt, Franklin, Garford, Haynes, Hudson, Inter-State, Jackson, Knox, Locomobile Marion, Lozier, Marmon, Marquette, Matheson, Maxwell, Mitchell, Moline, Moon, National, Oakland, Oldsmobile, Overland, Packard, Peerless, Pierce-Arrow, Pope-Hartford, Premier, Pullman, Rapid, Reliance, Reo, Selden, Stearns, Stevens-Duryea, S. G. V., Stoddard-Dayton, Warren, Thomas, Winton.

When the A. L. A. M. was at its greatest size, just before the decision of the Selden litigation, there were fifty members and thirty-four licensees. The board of trade has fifty full members on the threshold of the new year, and there is every indication that it will continue to thrive and be a power for good in the motor industry.

ACCESSORY DIRECTORS CHOSEN

New York, Jan. 10—Special telegram—H. T. Dunn, L. M. Wainwright and E. S. Fretz were re-elected to the board of directors of the Motor and Accessory Manufacturers at the annual meeting today for term of 3 years. T. C. Billings was chosen to succeed F. E. Castle, who retired from the board. The directors will assemble Friday morning to elect officers for the year. The annual dinner takes place this evening at the Waldorf.

The election of two new members to the Motor and Accessory Manufacturers was the chief business accomplished at the meeting of the board of directors of that organization Tuesday afternoon. The new members are the John L. G. Dykes Co., of Chicago, and the Cotta Transmission Co. The directors finished up their report and the term of the board expired.

NEW YORK, Jan. 9—Special telegram—Good roads and touring matters occupied the attention of the A. A. A. executive committee at its meeting today, Chairman George C. Diehl submitted a report on the prospects for the forthcoming federal aid convention to be held at Washington January 16-17. Chairman Diehl's report showed that in more than half the states the taxable resources are less than $20,000 for each mile of highway to be maintained. This, he argued, demonstrated the necessity for governmental aid in building interstate roads. He showed by statements from several prominent congressman that road improvements are quite as appropriate as a field for federal aid as rivers and harbors, and vastly more important.

Reports from New Jersey told of the efforts now being made to introduce an adequate law and thus establish friendly relations with other states.

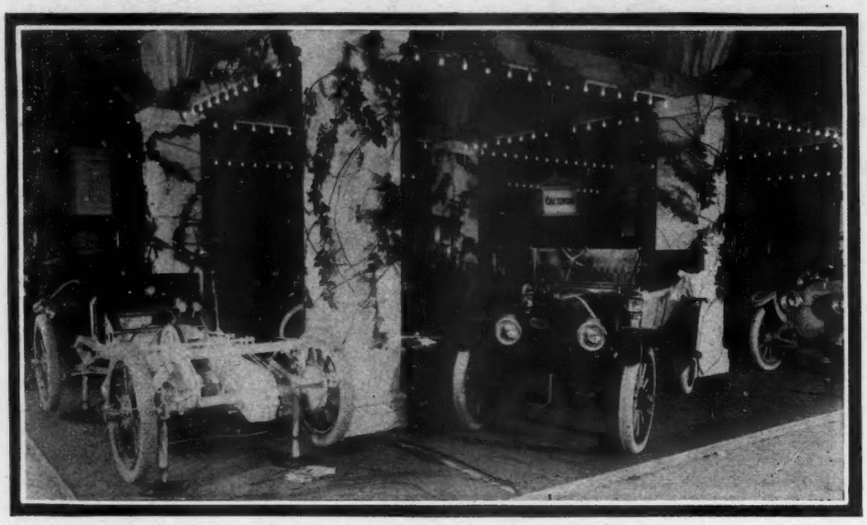
President Staples of Connecticut reported that a 30-day exemption from registration would be granted to non-residents irrespective of whether they lived in New Jersey.

ALCO TRUCK IN ANOTHER TEST

New York, Jan. 10—Two records for non-stop service held by Alco trucks have been attacked by a 3½-ton Alco that Saturday entered upon 2 weeks of duty for the United States Express Co. Displaying large signs covering the sides of the truck, the vehicle plied its way from early in the morning throughout the day and night. It hauled merchandise of every description.

Two trips hourly were covered on the average the first day. The duties later were shifted to hauling and collection of

BRUSH COURIER APPEARS AT SHOW



DECORATIONS THAT ARE FOUND IN THE RESTAURANT

smaller merchandise, when an average of twelve stops an hour were made in a number of New Jersey cities.

Finishing 100 hours of service in its self appointed task of working continuously one of its 3½-ton trucks, the American Locomotive Co. announced at 9 o'clock this morning that the car was going along smoothly and consuming 1 gallon of gasoline for each hour of service. Actual deliveries are being performed and the stops each day average 106.

This is the third Alco demonstration. The first run of 168 hours was held a year ago. For 6 days and nights the truck operated in the streets of New York. On the seventh, in the face of the worst snow storm of the winter, it made an overland run to Philadelphia. During the Christmas rush in Philadelphia a few weeks ago the event was in the nature of continuous service for the Adams Express Co. of that city.

SUSTAINS KLAXON PATENTS

New York, Jan. 10—Special telegram—A final decree has been entered by consent in the suit of the Lovell-McConnell Mfg. Co. against Henry Phillips doing business under the name of the H. Phillips Rubber Works. The Lovell-McConnell company sued Phillips for infringement of three basic Klaxon patents in the United States circuit court and the decree declares the validity of the patents and enjoins the defendant from infringing.

SUES ON AIR GAUGE PATENT

New York, Jan. 10—Special telegram—The answer of A. Schrader's Sons, Inc., in the suit of the Twitchell-Garvey Mfg. Co., of Los Angeles, Cal., involving the alleged infringement of the Twitchell air gauge patent was filed in the United States district court Monday. The Twitchell company charged in its complaint that its basic patent was being infringed by the New York company and asked for injunction and the usual relief provided in equity. The answer is a denial of infringement by the defendants and the setting up of a patent now owned by the Schrader concern, which is dated March 1, 1898. The defendants claim that the Schrader gauge is materially different from that of Twitchell, so different in fact as to take it outside the Twitchell patent entirely aside from the difference in dates at which the controversial patents were granted.

The Twitchell company has announced that in future it will sell direct to dealers by a branch house system. A branch has recently been decided upon for the Chicago territory and a branch factory will be located at Lansing, Mich.

CHANGE IN OTTO COMPANY

New York, Jan. 8—An announcement made at the show is to the effect that the Otto Mobile Co. has just been formed in Philadelphia to take over the manufacture of the Otto car, previously manufactured by the Otto Gas Engine Works of Philadelphia. This company has been incorporated under the laws of the state of New Jersey with a capitalization of $500,000 and the following officers have been elected: Murrell Dobbins, of Philadelphia, president; William S. Jones, of Philadelphia, vice-president; T. D. Marren, of Mt. Holly, treasurer; E. H. Ervin, of Philadelphia, secretary and general manager; W. S. Rendell, of Mt. Holly, director.

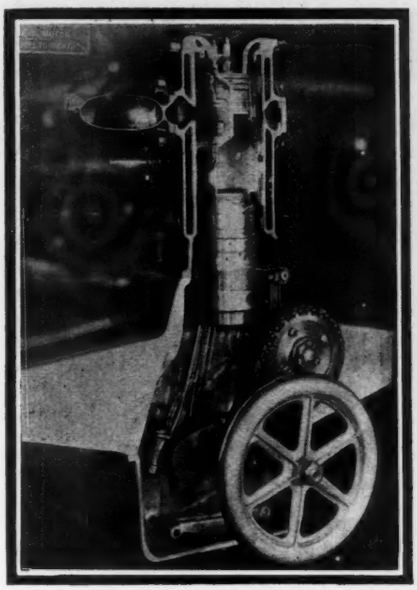
It is the purpose of this new company to immediately build a new factory at Mt. Holly, N. J., in which Otto pleasure cars, Otto trucks and Otto motor parts will be manufactured.

RUBBER DECISION REVERSED

New York, Jan. 9—Henry A. Gould Co., a corporation engaged in crude rubber importing and sale, secured a reversal of the judgment of the United States circuit court for the southern district of New York, which awarded the Pennsylvania Rubber Co. damages of $11,772.72 based upon a rubber contract. The United States circuit court of appeals reverses the findings of the trial court, and the case is sent back for retrial.

The facts as they were alleged at the trial and in the brief of counsel for Gould outline a situation where the broker contracted to deliver a certain grade of merchandise, known to the trade as regular grade Manicoba. Part of the contract amount of rubber was delivered and received but the remainder was rejected by the chemist of the Pennsylvania company because he found that it would not vulcanize evenly. The contention of the Gould company was that the rubber delivered was in accordance with the terms of the contract and that the fact that it would

APPEARANCE OF GARDEN UPON ENTERING AMPHITHEATER



STODDARD-KNIGHT HAND-OPERATED

not vulcanize according to the ideas of the Pennsylvania company was not material to the validity of the contract. The lower court held that it was material and the upper court reversed the findings.

TALK LOWER TIRE PRICES

New York, Jan. 10—Special telegram—The majority of tire manufacturers have been busy during the last few days on what appears to be a cut of approximately 5 and 10 per cent on tire prices to dealers, the reduction being 10 per cent to preferred tire dealers and 5 per cent to the majority of the regular dealers. It would appear that this reduction in prices will not in anywise affect the prices of tires to consumers. It is difficult to discover exactly the real reason for this price alteration, as it is not due to any price reduction in raw materials or to any changes in conditions in tire methods of manufacture. It would appear that it is more or less a problem of competition among many of the different tire makers.

It is reported generally that four companies have already notified their dealers of the reductions and that several others will be announced within a few days.

GARDEN ATTENDANCE

New York, Jan. 8—Opening day attendance at the garden was just under 11,500, according to Colonel Pope of the show committee. This is above the average of recent years but below that of last year.

Last year the average daily attendance was 20,000, figuring on two full sessions a day. On that basis the crowd of opening night was well above the general average of last year, as only one session could be charged against Saturday's attendance.

In preparing for business the show committee went to much pains this season. Entirely aside from the avalanche of invitations that were sent out by individual exhibitors, the tickets for which have been paid for by the exhibitors, the show committee on its own behalf invited over 7,000 dealers in motor cars and accessories to attend as its guests. All told, it is estimated, 100,000 tickets and invitations have been sent out.

While no definite figures were ever submitted as to the detailed cost of staging the shows at the Madison Square garden, it was given out unofficially that the cost in 1911 was $45,000. As a matter of fact it was much nearer $100,000. This year, with the simpler form of decoration and other improvements and economies of installation and operation, it is thought that the bill will be considerably less than in 1911. It would surprise no one if the total was found to be not more than $50,000. Each year the expensive steel work needed for the show has been torn out and sold at its conclusion. Nothing was kept but the furniture and some of the more permanent decorative factors.

There is a brand new imported system of admission. During a recent visit to Europe Samuel A. Miles noted the fact that the European system of admission to any kind of a big show was more exact than our own and thereupon he arranged to introduce the system used at Olympia

HUDSON MUD APRON

at Madison Square garden. This consists of an aisle of barred ticket booths, through which the visitors have to pass to reach the turnstiles. In Europe there is a barred wicket before the cage of each ticket seller and so there was on opening night at the garden. But in Europe, particularly in England, little paper money is used and more coin, so that in making change there is no special amount of space needed to accommodate such a wad for instance as would be pushed out at a ticket buyer at Madison Square garden in return for a $10 bill, especially if the change was made in $1 bills. The wickets caused some little delay Saturday night, but they have now been removed.

LACROIX A CAR MAGNATE

New York, Jan. 10—Special telegram—The tendency toward centralization that is apparent in some other lines is quite palpable as regards the imported cars sold in New York. The currently announced acquisition of the metropolitan sales rights for the Mercedes line by Paul Lacroix, president of the Paul Lacroix Auto Co., Inc., as an individual, is the case in point. The Mercedes import rights are held by the Daimler Import Co., of which James M. Carples is the active head. These rights will be retained by the Daimler Import Co., but the metropolitan sales rights have been conveyed to Lacroix. The present line handled by Lacroix includes the Renault, English Daimler, Itala, Zedel, Clement-Bayard and Mercedes. There was a report in circulation that the Lancia would be added to the line, but there appears to be no justification for such a conclusion. As it stands at present the Lacroix line includes at least one-third of the makes of foreign cars that enjoy a comparatively large sale in the United States.

GILSON OFF MITCHELL STAFF

New York, Jan. 10—James W. Gilson, for several years sales manager of the Mitchell-Lewis Motor Car Co., of Racine, Wis., has resigned his position with the Mitchell company, confirmation of the resignation which went into effect the first of the year being received here today from the Mitchell company officials at Racine. It was rumored that Mr. Gilson would ally himself with the Woods Motor Vehicle Co., of Chicago, taking the place left vacant by the retirement of Carl Metzger. This rumor was denied today by the Woods company, which announced that the vacancy had been filled.

O. J. Woodard, of Akron, O., is the man selected for sales manager of the Woods company. Mr. Woodard has been sales manager of the Diamond Rubber Co.

ZUST SCHEDULE FILED

New York, Jan. 9—Schedules filed in the federal court by the Zust Sales Co. of New York show assets and liabilities of about $37,000 each. The company has been in financial difficulties for several months.

SHOWING CHALMERS SELF-STARTER

Lifting the Motor Veil of Future Years

Motor Age's Prophet Finds Car of 1913 Will Be Better At $1500 Than One Which Cost $2500 2 Years Ago—Season Will Be Another Long-Stroke Era

IN 1913 the buyer will get for $1,000 as good a car as the one for which he paid $1,500 in 1910. He will get if anything a somewhat better car if he wishes to pay $1,500 for it than he could purchase 3 years before for $2,500. The average $1,500 car which will sell for, we will say, between $1,250 and $2,000, will have a more powerful motor, a wheelbase almost as long, and design in general almost the same as the $2,500 car of 1910. This car will have a bore of 4.30 inches, practically the same as the diameter of the cylinder of the $2,500 car of 1910, which was 4.31 inches. It will be, above everything, a long-stroke motor with a piston stroke of 5.20 inches, greater than that of either the $2,500 or the $4,000 car 3 years before. Its horsepower according to the S. A. E. rating will be 32.0 horsepower, 1.4 horsepower more than should be found in the average car for $2,500 in 1910. Its wheelbase will be 121 inches, making a longer car than could be obtained by the expenditure of from $2,000 to $3,000 in any of the preceding years.

THE 1913 CAR

	$1000	$1500	$2500	$4000
S. A. E. horsepower	23.5	32.0	38.5	41.0
Bore, inches	3.78	4.30	4.50	4.70
Stroke, inches	4.50	5.20	5.25	5.65
Wheelbase, inches	108	121	125	130
T-head percentage	4	20	50	42
Shaft percentage	87	98	100	98
Pump percentage	42	72	100	94

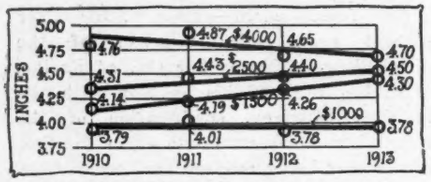
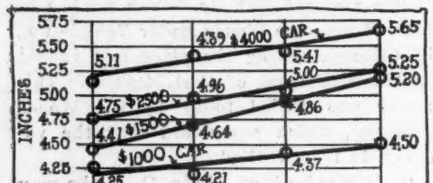
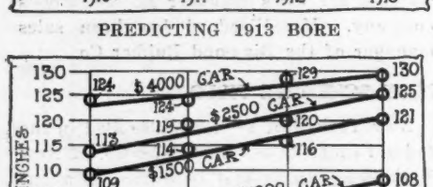


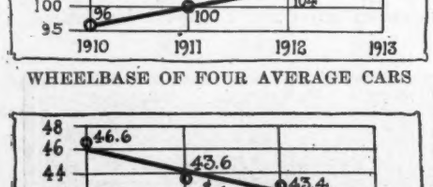
CHART OF STROKE FOR 4 YEARS



PREDICTING 1913 BORE



WHEELBASE OF FOUR AVERAGE CARS



CURVES SHOWING TREND OF MOTOR POWER FOR 3 PAST YEARS AND THE FUTURE

In other respects the $1,500 car of a year from now will be a better car than the $1,500 car of 3 or 4 years ago. In general, this coming car at $2,500 might be described as follows: It will have a four-cylinder motor, of course, with a bore of 4⅜ inches, a stroke of 5 3/16, the cylinders cast in pairs and the valves on one side. Tires will be 36 by 4 front and rear and cooling will be by water circulation maintained by gear-driven centrifugal pump. It will have a cellular radiator, dual ignition with magneto and storage battery, will have semi-elliptic springs in the front, three-quarter elliptic in the rear, semi-floating rear axle, will have a selective three-speed gearset, a cone clutch and shaft drive. It will have distinctly a long-stroke motor and the ratio of bore to stroke will be 1 to 1.21.

Prophecy Not Guesswork

To make a prophecy of this sort regarding cars a year in advance of announcements is not the matter of guesswork it might seem at first glance. There are certain trends in design and construction of the various parts of cars which point inevitably to certain results for the future. For the past 3 years Motor Age has published tables and kept accurate figures on the average car for each year. These cars have been divided into four classes on the basis of list price and the average dimensions of the cars in each class have been tabulated. Therefore it has at hand figures which show the trend for the year of 1910, 1911 and 1912 and if these figures be plotted to scale, a line connecting the points so obtained will show graphically the trend in each particular.

If these lines be produced until they intersect at a vertical line which can be taken to represent 1913 we will obtain very fair values for the average car of that year. The accompanying charts on these pages have been obtained in this way. It will be noticed that the values of the horsepower of the various classes of tires have been plotted on a chart for the years of 1910, 1911 and 1912, and the straight line through the points representing the horsepower of the average car for these years has been produced or extended to intersect a vertical line representing the year of 1913. The same is true of the average bore, average stroke, the average wheelbase, the percentage of pump circulation of cooling water and the per cent of shaft drive in each of the four price classification. The horsepower of the $1,000 car for instance in the accompanying curve has been found to be 22.5. To obtain this value, the average horsepower of the $1,000 car in 1910, which was calculated at 19.9, was marked on the chart. The horsepower of 21.2 for the average car in this class of 1911 was plotted to the same scale, likewise the horsepower of 21.2 for this year. A straight line connecting these three points was drawn and extended to the 1913 line, where it is found it intersects at a point corresponding to 22.5 horsepower.

As to Horsepower

It therefore is a certainty that if the trend evidenced for the past 3 years be continued for the ensuing year, the average $1,000 car in 1913 will have 22.5 horsepower. That such a trend will continue is a very fair assumption in view of the quite even ratio at which the line rises. However, if only the years of 1911 and 1912 were considered a different result would be obtained in view of the fact that the horsepower of the average $1,000 car was 21.2 in both instances, in which case the line would be a horizontal one instead of rising, and the average horsepower for the year 1913 still would be 21.2. It is evident, therefore, that exact predictions cannot be made with results covering only a period of 3 years, for had there been at hand average figures for former years it is quite possible that the prediction would be modified somewhat by a variation in the slant of the line. The same considerations will hold good for the other classes and for the other charts. It will be noticed that in considering the $2,500 car the horsepower line does not touch any of the points which represent the figures for the average car for the 3 past years, but the line has been drawn as closely as possible to the points representing those figures. The $1,500 car has been considered first as it shows the most radical development for the next year, which means that the car of this class will approach more nearly to the car

Predicting the Car of a Year From Now

Features of the Four Classes of Gasoline Vehicles of 12 Months Hence As Shown By Trends for Past 3 Years —How Curves Foretell Coming of Ideal

of the higher classes than any of the others.

Considering the average car which will sell in 1913 under $1,250, that is the $1,000 car, we find from these charts that there will be very little increase in diameter of the cylinder, because for the past 3 years there has been very little increase, and it is safe to assume that the trend will remain the same. The chart for the bore shows that the $1,000 car had in 1910 a diameter of 3.79 inches, in 1911 4.01 inches, in 1912 3.78 inches. A line connecting these will have a slight slant to the downward, crossing the 1913 line at 3.78 inches, the same figure as obtains for this year. There has been, however, a radical increase in the stroke, which has been uniform throughout the 3 years under consideration, and gives us a stroke for the $1,000 car of 4.50 1 year ahead. Such a conclusion is consistent with the present trend towards the long-stroke motor. The mere fact that the bore has not increased does not mean that the horsepower has remained the same, for the increasing employment of the four-cylinder motor in this class, replacing motors of one and two cylinders has had the effect of increasing the horsepower—an effect which is still more noticeable for the year 1913.

Trend in Wheelbase

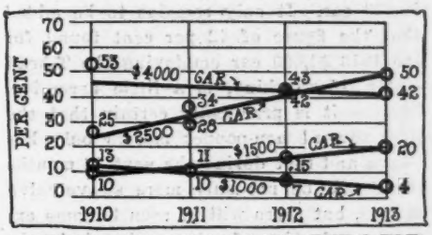
Passing to the wheelbase of the $1,000 car we find that it shows a very rapid gain. The slant of the line is practically the same as that for the $1,500 car and the $2,500 car, and the three taken in conjunction show that in these three classes the tendency toward lengthening the wheelbase has been consistent and uniform. Selecting another representative feature of construction, that of the percentage of the cars using pump circulation as a method of water-cooling we find that taking the 3 years together there has been a gradual rise, but this rise has not been consistent, as will be noted by the fact that the points representing these figures for 1910 and 1911 cannot be made to fall in a straight line. From 1910 to 1911 there was a drop in percentage in cars of this price employing this feature from 30 to 24. From last year to this, there was a rise from 24 to 39, but a line which would show the general trend for the 3 years if produced to the 1910 line will give a figure of 42 per cent for the $1,000 class. The statements made in regard to the figures on pump circulation on the $1,000 car also are true of this class of car in the matter of shaft drive. While there has been no decrease in the per cent of cars using this method of final drive, the increase has not been uniform, in fact, the figure of 80 per cent obtained for the average car in 1910 remains the same for 1911, but jumps to 86 per cent in 1912. But a line intended to connect these points would show a percentage of 87 for 1913, showing that seven-eighths of the cars for next year will be equipped with shaft drive.

Bore of 1913 $2,500 Car

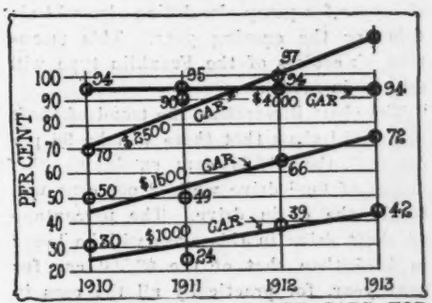
The $2,500 car for 1913 will have a bore of 4½ inches, but little more than that of the $1,500 car. It will have a stroke of 5¼ inches which is slightly greater than the $1,500 for next year. Its horsepower, however, will be considerably greater, meaning that the present tendency for the increasing use of six-cylinder motors in this class will be continued. In wheelbase, the $2,500 car of next year will have 125 inches, an increase of 5 inches over this year's average figures. A peculiarity of motor design is evidenced in the chart showing a percentage of T-head motors. That is, that there will be more motors in the $2,500 class employing the T-head design than in the $4,000 class. This probably is due to the tendency toward other than poppet-valve motors. It is practically certain that next year as well as this, cars to which are fitted slide-valve and rotary-valve motors will sell for over $3,000. This will bring down the percentage of cars in the higher class which employ motors of T-head design but does not mean that there is a tendency on the part of the industry toward L-head or valve-in-the-head motors.

Curves are different from figures, in that curves such as is shown here can lie. This is evidenced in a striking manner in the chart showing the percentage of pump circulation. The line representing the figures of this feature of the $2,500 car for the past 3 years, if extended to the 1913 line would show that there would be 115 per cent of the cars employing this means of cooling, which is an absurdity. We are at liberty to assume, however, from this that practically all, or say 100 per cent, of the cars will use this means of cooling, particularly in view of the fact that 97 per cent of the cars in this class this year employ a pump in circulating water. The same absurdity is evidenced in the average figures of shaft drive in cars selling between $2,000 and $3,000. The 1913 car, according to the curve, would have about 103 per cent of its representatives equipped with shaft drive. It consequently is safe to assume that all of them next year will be so equipped.

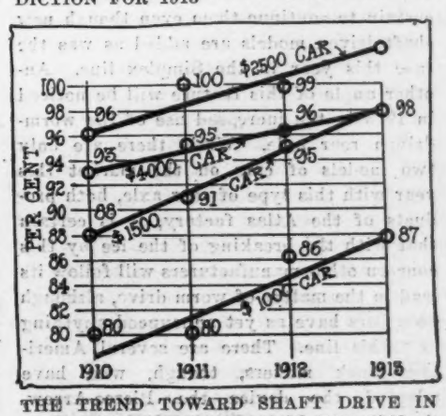
Passing to the cars which sell for over $3,000, designated as the $4,000 class, we find that only in the matter of stroke is there that development which has been noticed in cars of the other classes. This merely shows that in spite of the conservatism of the manufacturers of the higher-priced cars the call for long stroke motor is irresistible, and that this feature of development is the most general throughout all the class. There will be noticed a lessening of cylinder bore which has been fairly consistent for the past 2 years. The bore for 1913 will be slightly greater than that of this year, but much less than that of either 1 year or 2 years ago. In the matter of horsepower there is a very decided and consistent downward trend, showing that manufacturers of cars in the $4,000 class are adopting the European method of getting small rated horsepower by decreasing the bore and yet



PERCENTAGE OF CARS FOR THE 3 PRECEDING YEARS USING PUMP CIRCULATION OF WATER AND A PROPHECY OF THE 1913 CAR. ALL CHASSIS MODELS FOR EACH YEAR ARE DIVIDED INTO FOUR CLASSES ON A BASIS OF PRICE



CURVE OF THE AVERAGE CARS FOR 1910, 1911, 1912, SHOWING TENDENCY TOWARD THE T-HEAD MOTOR WITH PREDICTION FOR 1913



THE TREND TOWARD SHAFT DRIVE IN FOUR AVERAGE CLASSES FOR 1913

Season of Show Activity Promised

retaining flexibility and overload capacity of the motor by the increasing stroke. This year's feature of small-bore six-cylinder motors probably will be more in evidence in 1913.

A certain amount of conservatism is evident in the matter of wheelbase. A glance at the wheelbase chart for the four classes of cars shows that the $4,000 car has a much less rapid increase during the 3 previous years than is found in the others. This merely adds confirmation to the estimate of conservatism of makers in this class. The cars have been increased somewhat in wheelbase, although the figure is slight. The figure of 130-inch whhelbase which is obtained for the average $4,000 car 1 year from now is only 1 inch in excess of that in this year's car in that class. The matter of percentage of T-head motors in this class has been discussed in connection with that of the $2,500 car. It only remains to be added that the figure of 42 per cent found for the 1913 $4,000 car employing the T-head motor, if anything, is a little excessive, because it is practically certain that the rush toward non-poppet motors only has begun and that during the next 12 months there will be not only more sleeve-valve motors, but there will be seen to some extent an adoption of rotary-valve design in cars of this class.

Water Circulation.

In the matter of water circulation the figure of 94 per cent which obtained for this year for pump circulation also will obtain for the ensuing year. This means that air-coolers of the Franklin type will still be in evidence.

The chart illustrating the trend of shaft drive will show that there will be 98 per cent of the $4,000 cars employing this means of final drive while 2 per cent will retain the chain drive. The percentage of shaft drive in this class will be lower in 1915 than that of the $2,500 car for next year, for practically all the cars in the lower class are shaft-driven and will be. The manufacturers who are producing chain-driven models are practically certain to continue them even though new shaft-driven models are added as was the case this year in the Simplex line. Another angle of this feature will be noticed in 1913 in the increased use of the worm-driven rear axle. While there are only two models of cars on the market this year with this type of rear axle, both products of the Atlas factory, it is certain that with the breaking of the ice by this concern other manufacturers will follow its lead in the matter of worm drive, although no others have as yet announced anything in ththis line. There are several American truck makers, though, who have adopted the device—the Pierce-Arrow, Franklin and Blair.

Milwaukee Opens Next Saturday Night With 150 Pleasure Cars, Fifty-Five Commercials and Many Accessory Exhibits —Buffalo Asking for National Recognition Next Year

MILWAUKEE, Wis., Jan. 7—The fourth annual Milwaukee show will open next Saturday evening in the immense Auditorium, where more than 150 pleasure cars, gasoline and electric; fifty-five commercial vehicles or both power types, and many accessory exhibits are now being arranged in a manner that will make the whole a near approach to the big expositions in Chicago and New York. The innovation of opening a show on a Saturday night is to be tried for the first time and doubtless will be highly successful from a financial standpoint.

Saturday night has been designated the Milwaukee Automobile Club night and the entire membership of 600 will meet in one of the smaller halls of the Auditorium and march into the main arena at the stroke of 8 to formally open the show. The event is in honor of the club, which originated the show idea in Milwaukee and held two large expositions, the work since 1910 having been taken up by the Milwaukee Automobile Dealers' Association.

The main arena decorative scheme will be that of an Italian garden, the idea of Manager Bart J. Ruddle. The smaller halls and the vast basement hall will be decorated in a similar manner.

On January 17 the annual meeting of the Wisconsin State A. A. will be held in connection with the show. On the following day the Wisconsin state highway commission will hold a good roads rally and demonstration. The Wisconsin Retail Automobile Dealers' Association will meet on January 16.

The show will this year cover 52,750 actual square feet of floor space. The gross space is 65,000 feet, which includes columns, seats, etc.

BUFFALO WANTS A NATIONAL SHOW

Buffalo, N. Y., Jan. 9—The members of the Buffalo Automobile Trade Association almost to the man will attend the Madison Square garden show in an effort to launch a boom for a national exhibition for Buffalo next year. The exhibition which closed in Buffalo on Saturday evening was the most successful in point of sales that has ever been held in this city, and with Buffalo's advantages by way of location, railway facilities and hotel accommodations, it ought to be an easy matter for this city to land a national show for 1913.

"We had a national show this year in everything but name," declared President John J. Gibson, of the Buffalo Automobile Trade Association. "The people came

Coming Motoring Events, Including List

JANUARY

Madison Garden

January 6-13 — Madison Square garden show; Automobile Board of Trade, H. A. Bonnell, manager, 7 East Forty-second street, New York. Pleasure cars and accessories, 6-New York. Pleasure cars and accessories.

January 10-13—Second annual show, Peoria, Ill.; A. H. Whigham, manager, Peoria, Ill.

Grand Central

January 10-17—Annual show, Grand Central palace, New York; National Association Automobile Manufacturers, S. A. Miles, manager, 7 East Forty-second street, New York.

Milwaukee

January 13-19—Milwaukee show; Malwaukee Automobile Dealers' Association, B. J. Ruddle, manager.

Philadelphia

January 13-27—Show of Philadelphia Automobile Trade Association, Philadelphia, Pa.

January 15-20—Show at Toledo, O.; H. V. Buelow, manager, Toledo, O.

Madison Garden

January 15-20—Twelfth annual show, Madison Square garden, New York; commercial division, Automobile Board of Trade, H. A. Bonnell, manager, 7 East Forty-second street, New York.

January 18-20—Annual meeting Society Automobile Engineers, New York.

January 22—Show at Dubuque; Dubuque Automobile Dealers' Association, D. H. McCarthy, secretary, Dubuque, Ia.

Detroit

January 22-27—Show at Detroit, Mich.; Detroit Automobile Dealers' Association; W. R. Wilmot, manager, 501 Bowles street, Detroit, Mich.

January 22-27—Show at Providence; Rhode Island Licensed Automobile Dealers' Association; Arthur S. Lee, manager, 52 Richmond street, Providence, R. I.

January 22-27—Annual show, Rochester, N. Y.

Chicago

January 27-February 10—Eleventh annual show, Coliseum, Chicago; National Association Automobile Manufacturers, S. A. Miles, manager, 7 East Forty-second street, New York. Pleasure cars, January 27-February 3; commercial, 3-10.

January 27-February 10—Annual show, Pittsburgh, Pa.; Automobile Show Dealers' Association of Pittsburgh. Pleasure cars, January 27-February 3; commercials, February 3-10.

January 29-February 3—Second annual show, Scranton, Pa.

FEBRUARY

February 1-7—Tentative dates for show at Washington, D. C.

February 1—Show at Harrisburg, Pa.

February 3-9—Show at Albany, N. Y.

February 3-10—Show at Harrisburg, Pa.

February 3-10—Show at Montreal, Canada; Automobile Club of Canada.

February 5-10.—Show of Automobile Dealers' Association of Wilkes-Barre; R. A. Rosenkrans, 37 West Market street, Wilkes-Barre, Pa., secretary.

February 5-12—Show at Buffalo, N. Y.; G. C. Fehrman, manager, 755 Ellicott square.

February 5-17—Annual exhibit, St. Louis; F. W. Payne, manager, St. Louis, Mo. Pleasure cars, 5-10; commercials, 12-17.

February 10-17.—Show at Atlanta, Ga., of Atlanta Automobile and Accessory Dealers' Association; Homer C. George, manager.

February 12-17—Show at Troy, N. Y.

Kansas City

February 12-17—Show at Kansas City, Mo.; Wallace J. Terry, manager, 302 Long building, Kansas City, Mo.

February 12-17—Show at St. Paul; St. Paul Motor Car Dealers' Association; W. R. Wilmot, manager.

Following the National Car Exhibitions

Philadelphia Cuts in This Week, While Syracuse Is Considering Securing Another Building—Grand Rapids Adds a Day While Sioux City Will Have Only One Display Instead of Two

here from all the cities as far west as Erie, Pa., as far east as Syracuse, N. Y., and from many points in Canada and the state of Pennsylvania. Now it is up to us to have a real national exhibition and in my estimation that exhibition will be held here next year."

A second show will be opened in convention hall, Buffalo, on February 5 and will run for a week. George C. Fehrman, of Buffalo, is in charge of this second exhibition.

DEALERS' SHOW IN MINNEAPOLIS

Minneapolis, Minn., Jan. 5—The first annual show under the management of the Minneapolis Automobile Dealers' Association will be held at the Auditorium February 19 to 22, inclusive. This is to be a dealers' show and it is the intention of the management to furnish each exhibitor with complimentary tickets in large numbers which the dealer can use to the best advantage. The Auditorium is centrally located in the downtown district and there is ample room for twenty-five exhibits.

SYRACUSE SHOW MAY OVERFLOW

Syracuse, N. Y., Jan. 6—With the annual show for Syracuse 2 months away, more than half the exhibition space in the Armory has been let. Manager W. R. Marshall says that it looks as if the accessories exhibition would have to be placed in the Alhambra, as an auxiliary. The biggest motor truck exhibit held yet will be seen. Thus far space is alloted to the Chase, Packard, Gramm, Sampson, Rapid, Brush, Franklin, Ford and Alco and it is expected ten more makes will be represented.

PHILADELPHIA PROSPECTS

Philadelphia, Pa., Jan. 8—Everything is in readiness for Philadelphia to make its swing into the show circuit next Saturday. Unlike last year, when no formalities were observed on opening night, the show committee of the Philadelphia Automobile Trade Association has concluded arrangements with Mayor Blankenburg, whereby the latter will officially start off the 2 weeks' exhibition.

The number of exhibitors who have taken space this year has surpassed any former show, and owing to lack of space many have had to be turned away. During the first week a total of fifty-three gasoline pleasure cars will be shown in the two armories; during the second week at least thirty-seven, perhaps forty, commercial vehicles will be shown, in addition to at least ten electric cars. The number of accessories exhibitors will run well up into the twenties, so that every available space will be utilized and all the space will be taken.

A change in the opening and closing hours of the exhibition over former years has been determined upon by the show committee. The show will open at 10 o'clock in the morning instead of noon and remain open until 11 o'clock instead of 10.

DETROIT HURRIES SHOW PLANS

Detroit, Mich., Jan. 7—Preparations for the local show, which opens January 22, are moving along at a rapid pace. The decorators are now in possession of the Wayne gardens and the temporary annex is rapidly nearing completion. Not a foot of space is left, either in the pavilion proper or the annex, and the indications are for a great display. Manager Walter Wilmot is predicting an attendance of close to 100,000. The spirit shown by the D. A. D. A. in erecting a temporary building on its own hook, to take care of the overflow, is being quite generally commended. This alone represents an investment of about $10,000, and the money realized from the sale of space will fall short of defraying this expense, it is declared by the management.

ONE SHOW AT SIOUX CITY

Sioux City, Ia., Jan. 5—Only one show will be held in Sioux City this year, instead of two, as last year. The show this year will be held in Davidson's block, February 26 to March 2. Last year the dealers held a show in the auditorium, and because of lack of space, and not being able to reach satisfactory agreements, outside dealers conducted another show, the same week, at the Princess skating rink. This year, however, in the new building, there will be much more space, so that the outside dealers will be invited to participate in the show. There were eleven exhibitors at the dealers show last year, and this year it is expected that there will be at least twenty in the one show.

GRAND RAPIDS ADDS A DAY

Grand Rapids, Mich., Jan. 5—Owing to the increasing demands for space and the undoubted popularity which will greet the 1912 Grand Rapids show, the show will be held for 5 days, February 13 to 17, inclusive, instead of 4. One of the features of the exhibit will be the decorations, which will be absolutely fireproof. Last year seventeen firms, showing thirty-two different cars, were represented, while this year the number of exhibitors will be twenty-seven, showing at least forty-five makes. It is expected that every make of car sold in Michigan will be represented. The floor space will accommodate 200 cars. The space allotted to the accessories has been more than doubled.

of Dates Selected for Shows of the Winter

February 12-17—Show at Ottawa, Canada; Ottawa Valley Motor Car Association.
February 12-19—Dayton, O., show; Elmer C. Redelle, manager, Dayton, O.
February 13-17—Show at Grand Rapids, Mich.
February 17-24—Cleveland show; Cleveland Automobile Show Co., F. H. Caley, manager, Cleveland, O.
February 17-24—Pittsburgh show; Pittsburgh Automobile Show Association, T. I. Cochran, manager, Pittsburgh, Pa.
February 17-24—Show at Newark, N. J.; New Jersey Automobile Exhibition Co.

Minneapolis

February 17-24—Minneapolis show; Minneapolis Automobile Show Association; H. E. Pence, manager, Minneapolis, Minn.
February 19-24—Show at Hartford, Conn.; Automobile Club of Hartford.
February 19-24—Seventh annual show of Omaha Automobile Association, C. G. Powell, manager, Omaha, Neb.

Cincinnati

February 19-25—Annual pleasure car show; Cincinnati Automobile Dealers' Association, E. A. Kruse, secretary, Cincinnati, O.
February 20-24—Show at Binghamton; Automobile Dealers' Association; R. W. Whipple, secretary, Binghamton, N. Y.

Baltimore

February 20-28—Annual show, Baltimore, Md.; Baltimore Automobile Dealers' Association.

Louisville

February 21-24—Fifth annual show; Louisville Automobile Dealers' Association, Louisville, Ky.
February 21-28—Toronto show; Toronto Automobile Trade Association; F. I. Fox, secretary, Toronto, Canada.
February 20-28—Annual show, Baltimore, Md.
February 24-March 2 — Annual show; Brooklyn Motor Vehicle Dealers' Association, Brooklyn, N. Y.
February 26-29—Annual commercial exhibit; Cincinnati Automobile Dealers' Association, E. A. Krause, secretary, Cincinnati, Ohio.
February 26-March 2—Show at Paterson, N. J.; Paterson Automobile Trade Association.
February 26-March 2—Second annual show Elmira Automobile Club, L. Blumenstein, manager, Elmira, N. Y.
February 26-March 2.—Show at Sioux City, Ia., of Sioux City Automobile Dealers' Association.
February 26-March 3.—Mississippi Valley show, Quincy Automobile Club, Quincy, Ill.; Harry F. Hofer, director.
February 28-March 2—Annual Davenport show; Woodworth Clum, manager, Commercial Club building, Davenport, Ia.

MARCH

March—Show at Norfolk, Va.

Boston

March 2-9—Pleasure car show, Boston; C. I. Campbell, manager.
March 4-9—Show at Des Moines; C. G. Van Vliet, secretary, Des Moines, Ia.

Denver

March 4-9—Show at Denver; G. A. Wahlgreen, manager, Denver, Colo.
March 6-9—Advertisers' motor show, Tiffin, O.
March 11-16—Show at Cedar Rapids, Ia.; M. P. Beck, manager.
March 13-20—Show of Boston Commercial Motor Vehicle Dealers' Association, Mechanics' building, Boston; C. I. Campbell, manager.
March 12-16—Show at Syracuse, N. Y.; Syracuse Automobile Trade Association; Syracuse, N. Y.

New Grand Central Palace

One Hundred and Fifty Exhibitors Display Their Wares Under Auspices of National Association ot Automobile Manufacturers—Visitors from Automobile Board of Trade Affair Attend First Night

MAIN FLOOR OF GRAND CENTRAL PALACE

NEW YORK, Jan. 10—Special telegram—The new Grand Central palace opened its doors tonight with 150 exhibitors showing motor cars and accessories. Of this number thirty-eight are exhibiting pleasure vehicles and an equal number of commercial cars are on view. Motor car accessories are shown by seventy-five of the exhibitors. Some commercials and the electrics are in the balconies.

The building, which is opened to the public for the first time tonight, occupies the entire block between Forty-sixth and Forty-seventh streets and is thirteen stories in height.

The entire three lower floors were designed especially for exhibition purposes and the floor space of the three floors is said to be four times as great as that of the main floor of the garden. More than 27 acres of space is covered by cars and accessories.

Although located on three levels, the exhibition hall has been so treated architecturally as to have the aspect of a spacious amphitheater. Near the center a large court rises to a height of 40 feet, through the second and third levels. This opening is 136 by 104 feet in the second floor and 85 by 40 feet in the third floor. An ornamental balustrade surrounding the court on the second floor, together with the massive columns that rise to the third floor level, give the effect of a mezzanine floor or gallery. Two main colannades of majestic Corinthian columns grouped in pairs extend across the court, leaving two main unobstructed exhibition areas 137 by 40 feet and a third similar area 115 by 40 feet.

A grand marble stairway 60 feet wide, built in three terraces, leads from the main entrance on Lexington avenue to the main floor. From the head of this stairway

Opens It's Doors to Motor Cars

Building Opened for First Time to Public, Which Is Delighted With It—Marble Staircase 60 Feet Wide Attracts Admiration—Western Makers Predominate—One Foreign Machine on View, an Aries

PALACE BEFORE MOTOR SHOW WENT IN

there is a vista of 190 feet between the columns to the great windows at the rear of the building. A distance of 11 feet between the columns makes a wide aisle that will form the center promenade at the motor car show. There are four stairways at or near the corners of the hall which lead to the mezzanine floor and third floor.

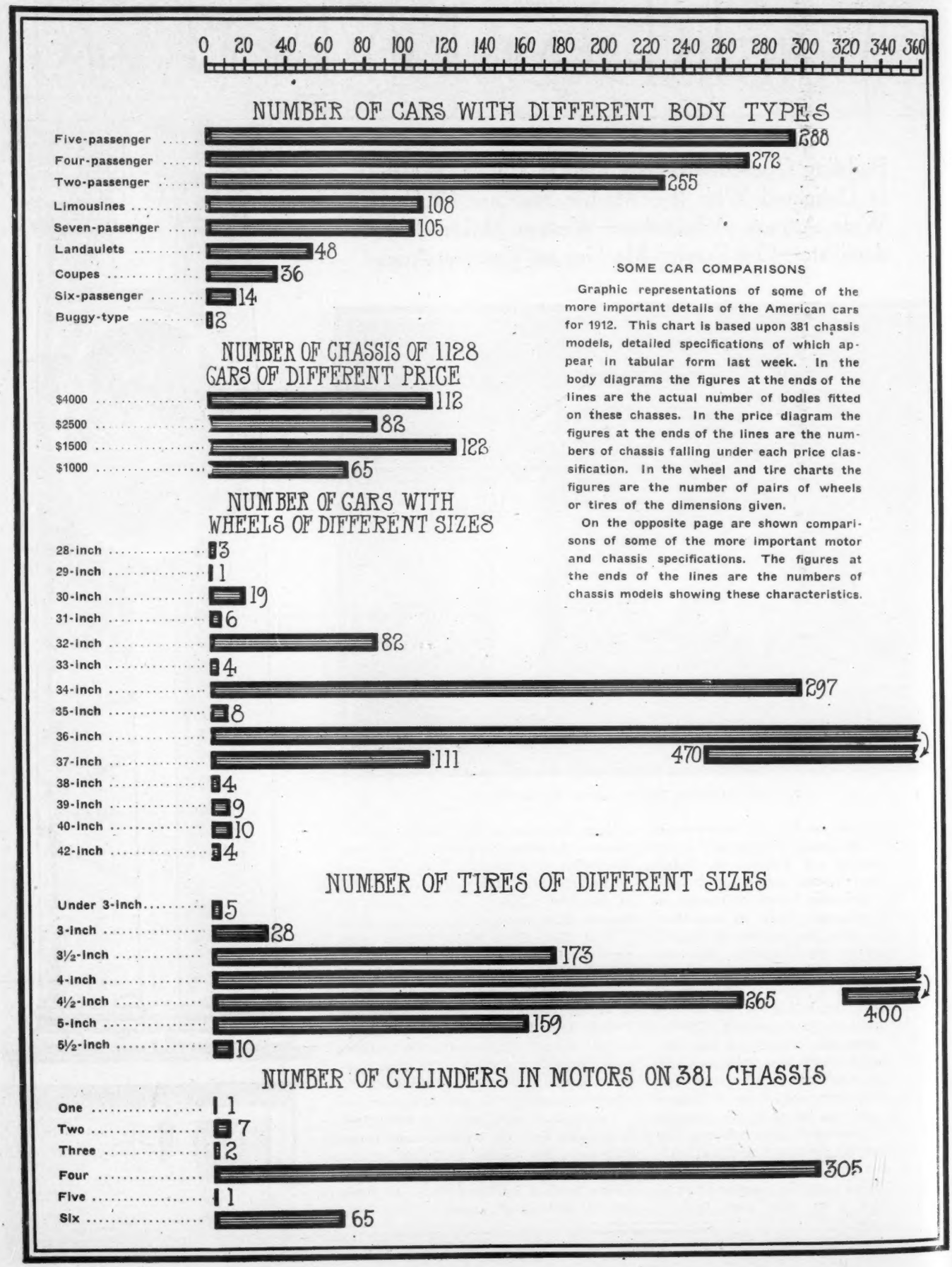
The simple but imposing architectural treatment of the hall gives the impression that little special decoration is needed for show purposes. But there has been special treatment of the walls and balconies. The walls are paneled from floor to balcony with reproductions of famous paintings and the balconies are trimmed with lattice work and autumn leaves. The signs announcing the spaces of the exhibitors are of a light green with gold letters hung by chains from the massive columns.

That there is no other than friendly rivalry between garden exhibitors and those in the palace was shown by the large delegation of exhibitors from the board of trade's show that visited the opening of the new palace in cars furnished by Samuel Miles, manager of the latter show.

It is distinctly a midde-western show, particularly as regards cars, only five pleasure cars exhibited being from the east. The only distinctly foreign exhibit is in the commercial section, where the French Aries truck is shown. There are several cut-out chassis with the working parts electrically lighted. The most elaborate chassis is the Lippard-Stewart truck, which is covered with gold leaf.

Visitors and exhibitors alike are united in praising the new building and its arrangement, the method of laying out the spaces, the wide aisles, and the decorative scheme devised by Manager S. A. Miles received enthusiastic praise.

Chart Showing General Body Status

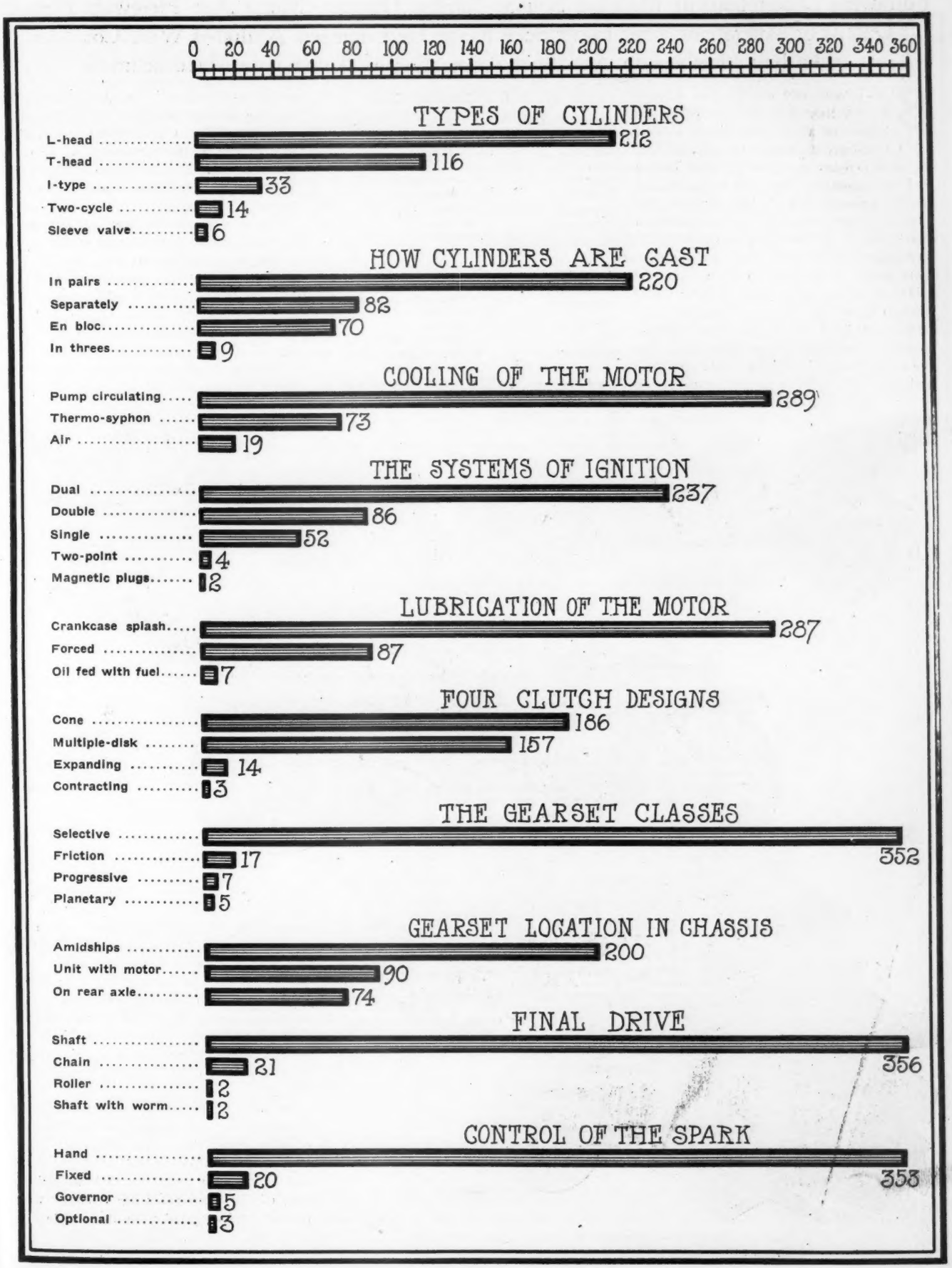


SOME CAR COMPARISONS

Graphic representations of some of the more important details of the American cars for 1912. This chart is based upon 381 chassis models, detailed specifications of which appear in tabular form last week. In the body diagrams the figures at the ends of the lines are the actual number of bodies fitted on these chasses. In the price diagram the figures at the ends of the lines are the numbers of chassis falling under each price classification. In the wheel and tire charts the figures are the number of pairs of wheels or tires of the dimensions given.

On the opposite page are shown comparisons of some of the more important motor and chassis specifications. The figures at the ends of the lines are the numbers of chassis models showing these characteristics.

Tendencies of American Pleasure Cars



Changes and Improvements for 1912

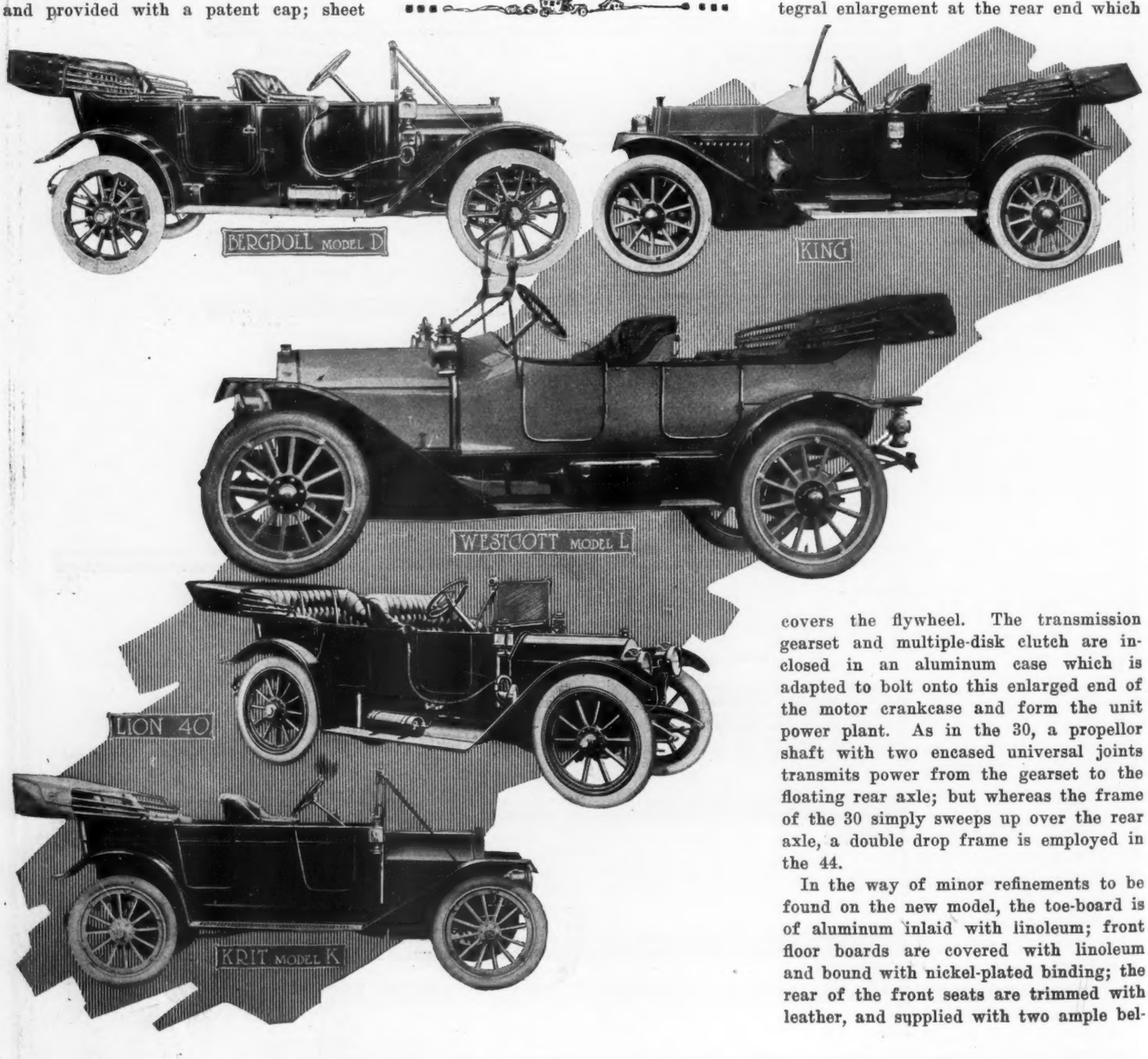
Following Descriptions of Madison Square Garden Display, Motor Age Herewith Presents Details of Alterations That Have Been Made By Engineers Affiliated With Concerns Holding Membership in Nationl Association of Automobile Manufacturers

BUILT upon two chassis, the Abbott-Detroit line for 1912 comprises six models in all. The Abbott-Detroit 44 is a new model which is a composite of all that is best in Abbott-Detroit design and workmanship. The 1912 model 30 is a refined reproduction of the car that the company has produced during previous years; and therefore it remains practically unchanged except that about 15 per cent more power is claimed to have been obtained by enlarging the bore ⅛ inch; valve tappets have been changed from the ball-and-socket type to the pivot-pin design, therefore increasing the wearing qualities; the crankshaft oil filler has been enlarged and provided with a patent cap; sheet metal webs extend from the motor crankcase to the side members of the frame, so that the mud-pan under the motor is eliminated, and a stronger bronze water pump replaces the die-cast white metal pump previously employed on the models of the Abbott company.

PALACE PLEASURE CARS

Abbott-Detroit	King
Auburn	Lion
Bergdoll	Marion
Cole	Metz
Cino	McFarlan
Cutting	Paterson
Correja	Paige-Detroit
DeTamble	Rambler
Firestone-Columbus	R. C. H.
Fiat	Regal
Great Western	Reading
Herreshoff	Stutz
Hupmobile	Schacht
Imperial	Stuyvesant
Krit	Velie
Klinekar	Warren-Detroit
	Westcott

There are several marked differences between the 30 and the new model 44, besides its increase in size, weight and power. The 44 has its motor, clutch and gearset combined in a single unit. The motor is a four-cylinder L-type with the cylinders cast in pairs and the valves inclosed. A horizontally-divided aluminum crankcase is employed which has an integral enlargement at the rear end which covers the flywheel. The transmission gearset and multiple-disk clutch are inclosed in an aluminum case which is adapted to bolt onto this enlarged end of the motor crankcase and form the unit power plant. As in the 30, a propellor shaft with two encased universal joints transmits power from the gearset to the floating rear axle; but whereas the frame of the 30 simply sweeps up over the rear axle, a double drop frame is employed in the 44.



In the way of minor refinements to be found on the new model, the toe-board is of aluminum inlaid with linoleum; front floor boards are covered with linoleum and bound with nickel-plated binding; the rear of the front seats are trimmed with leather, and supplied with two ample bel-

On Cars in Grand Central Palace Show

In General the Trend Is the Same As Is Found in Exhibition of Automobile Board of Trade, Including Equipment Without Additional Charge, Self-Starters, and Demountable Rims—Thirty-Three Makers Represented in Pleasure Car Section

lows pockets; there are large pockets in all the doors; ventilated fore-doors with shutters are fitted; the storage battery for lighting is underslung beneath the tonneau floor, and the horn is concealed under the motor hood.

Auburn

For the season of 1912 the Auburn will continue to build six of the 1911 models, and a new five-passenger touring car model designated 35-L is added. This new model is almost identical with the six-cylinder 50-horsepower car except that the motor has but four cylinders and a leather-faced cone clutch. The wheelbase is 115 inches, smaller wheels and tires are fitted, and it has a double drop frame. The Auburn line, therefore, includes model 6-50, a six-cylinder touring car; model 40-N, a five-passenger touring car; model 40-M, a two passenger roadster; model 40-H, a five-passenger touring car, model 35-L, five-passenger touring car, model 30-L, five-passenger touring car, and model 30-L, roadster.

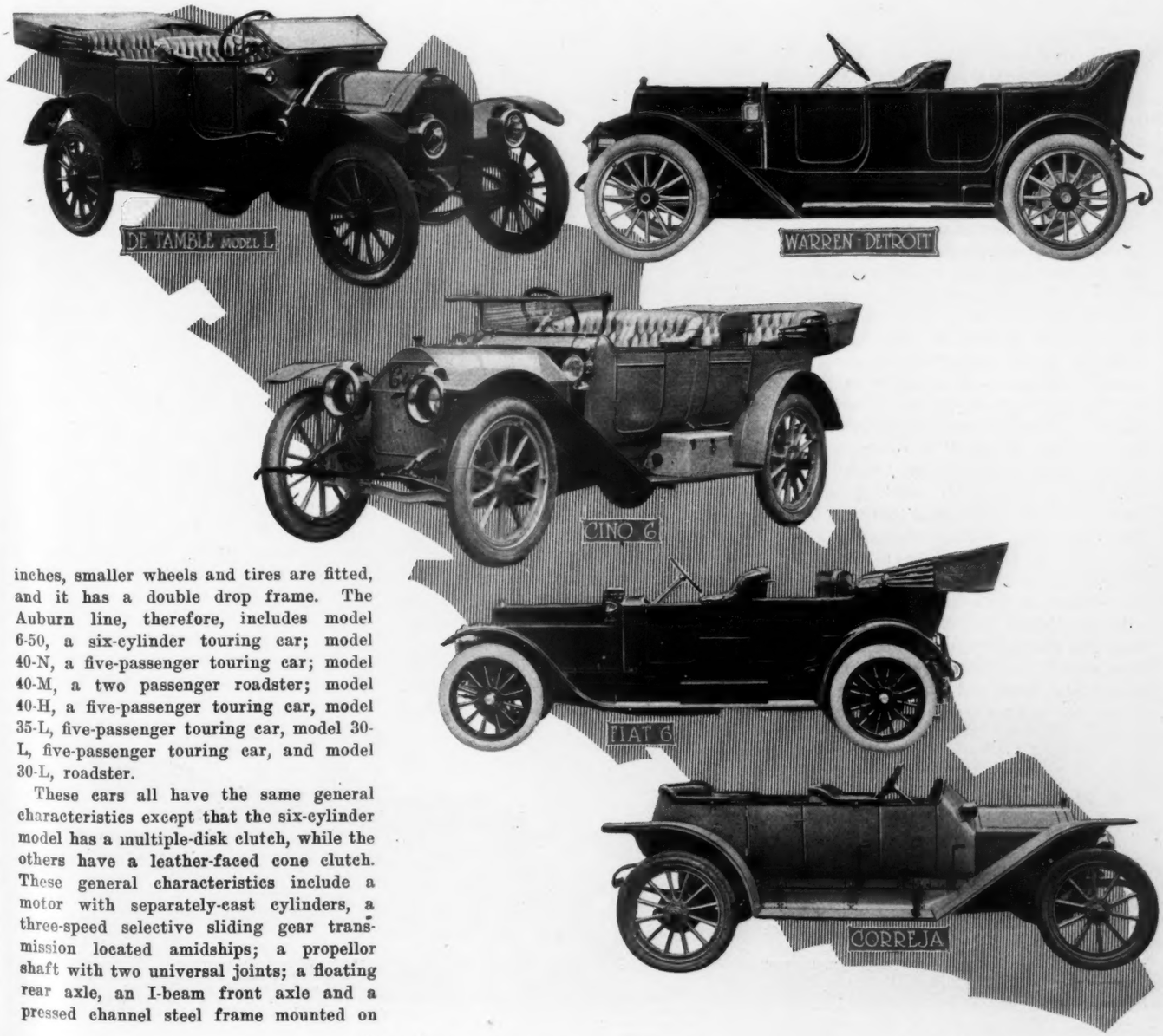
These cars all have the same general characteristics except that the six-cylinder model has a multiple-disk clutch, while the others have a leather-faced cone clutch. These general characteristics include a motor with separately-cast cylinders, a three-speed selective sliding gear transmission located amidships; a propellor shaft with two universal joints; a floating rear axle, an I-beam front axle and a pressed channel steel frame mounted on semi-elliptic front and three-quarter elliptic rear springs. The motors of all models have circulating oiling systems and all have Remy magnetos except the six-cylinder model which is equipped with a Bosch magneto. The line includes motors with three variations of cylinder dimensions, four variations in the length of the wheelbases, four different tire sizes and a slight difference in front axles.

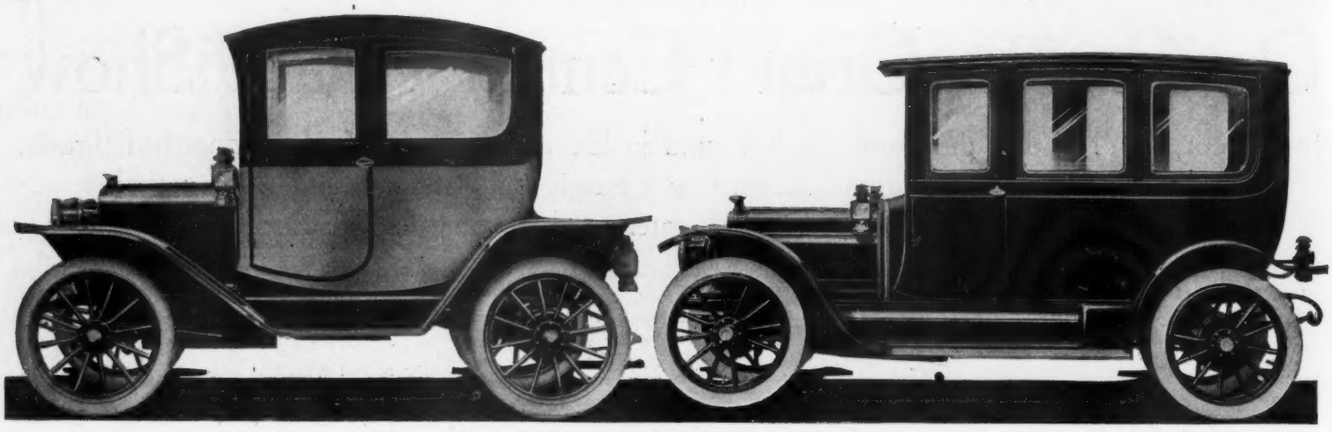
Bergdoll

Continuing the manufacture of the Bergdoll 30 which was first brought out last year the Bergdoll company has added a new and larger model having a long-

PALACE COMMERCIALS

Argo	Lippard-Stewart
Atterbury	Maxim tri-car
Atlantic	Motor Wagon
Bowling Green	Newark
Chase	Packers
Commer	Progress Development
Cortland	Sanford-Herbert
Dart	Schlotterback
Dayton	Schacht
Decatur	Sullivan
Durant-Dort	Universal
Eclipse	Veerac
Federal	Velie
Gramm	Walter
Kelly	Walker
Lauth-Juergens	





TWO COUPES, THE R. C. H. AND THE RAMBLER SEDAN

stroke motor with a self-starting mechanism and a four-speed transmission gearset with direct drive on third speed. This latter car has been styled the Bergdoll 40, it having a 4 by $5\frac{5}{16}$-inch motor which is claimed to develop slightly in excess of 40 horsepower. The Bergdoll 30 is continued with but few minor changes, chief of which is the application of both brakes on the rear wheel drums and the fitting of the motor with a new Bosch magneto of the easy-starting type. Another important feature of the 1912 car is that it will be fully equipped, inclusive of top and windshield, without a change of price.

As for the characteristic features of the new Bergdoll car, its design is almost identical with that of the Bergdoll 20 except that the motor has a longer stroke, the gearset gives four forward speeds instead of three, and wheels are equipped with 36 by 4 instead of 34 by 3½-inch tires. These general features include a monobloc motor with cylinders having the exhaust valves on the sides, as in the L type design, and the inlet valves in the heads of the cylinders. Lubrication of the motor is by means of a constant level splash system operated by a plunger pump and having sight feeds provided on the dash. The power is transmitted to a multiple-disk clutch having alternating steel and Thermoid-covered disks, to the gearset which is in unit with the motor. From the gearset a propellor shaft with two universal joints provides communication with the floating type of rear axle; the front axle is an I-beam drop forging; and semi-elliptic front and three-quarter elliptic rear springs are used between the axles and the pressed channel steel frame. Annular ball bearings are used throughout the motor, transmission and running gear.

Cole

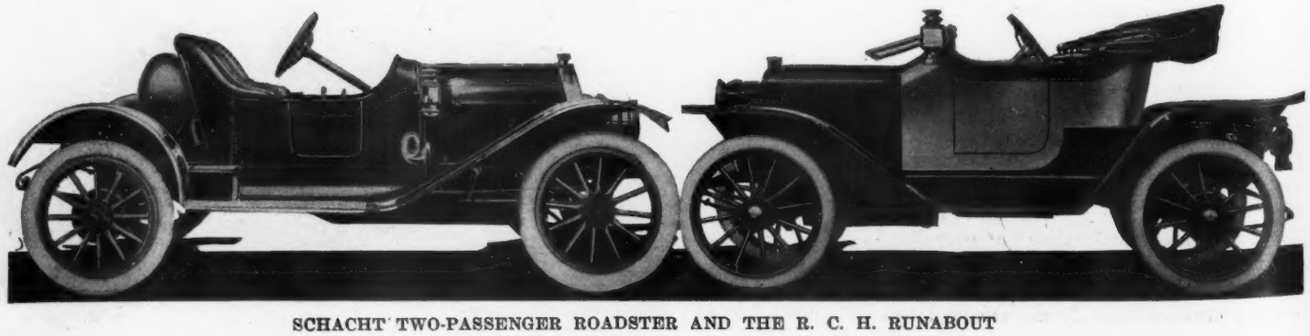
More power, a change in body lines and styles and the addition of one new model —that tells what the Cole people have done for 1912. The newcomer is model DD, which is a five-passenger car ordinarily, but can be converted into a seven-passenger through the aid of auxiliary seats. The motor in the new Cole engine has a bore of 4½ inches and a stroke of 5¼, whereas last year the size was 4½ by 4½. The cylinders are cast in pairs; the wheelbase is 122 inches; there are 36 by 4-inch tires; Timken front and rear axles, a self-starter and electric lights. None of the old models has been dropped by the company, which continues the roadster, toy tonneau and colonial coupe, the last-named carrying the 4½ by 4½-inch motor. In these, however, the wheelbase has been lengthened and larger wheels have been fitted, while the body lines also have been changed.

Going over the 1912 models one finds that there also has been a change in the lubrication system and that now there is a pump inside the oil reservoir. It is hard to define the exact class to which this system belongs. In operation it partakes of the constant-level splash system, while it possesses a decided advantage over the latter in that fresh oil is constantly added instead of the dead oil being used over again. This is a European idea which has been used by Mercedes and Rolls-Royce. The oiling scheme in detail was described in Motor Age, issue of September 28. Another change is the adoption of a floating rear axle of Timken design which has brought about a change in the brakes on the rear axle. Two sets of brakes are provided, which operate on the rear wheel drums which are 12½ inches in diameter and 2¼ inches wide. The service brakes, of the external contracting band type, are thrown into play by means of a pedal, while the expanding emergency brakes are controlled by a hand lever.

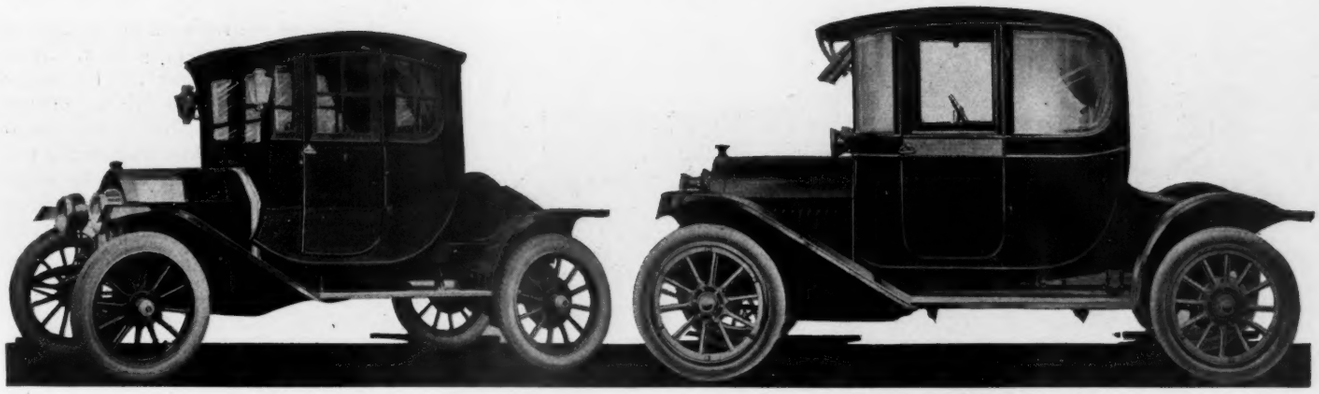
Changes wrought in Cole body lines have brought about the adoption of the Queen Anne style of panels and doors in the closed bodies. All the metal parts of the body either are nickel plated or black enamel, doing away with all polished brass surfaces.

Cino

Chief among the changes made in the Cino line for 1912 is the appearance of a six-cylinder model and scarcely less important is the change in design of the motors from the valve-in-the-head type to the T-head type. The one chassis model produced last year had a four-cylinder engine of 4⅜-inch bore by 5-inch stroke with valves located in the head. This year the four-cylinder motor is of the same dimension but is of the T-head type, with inclosed valves. The cylinders, as formerly, are cast in pairs and a Bosch or Eisemann magneto is supplied. The lubrication of the motor has been changed slightly from the circulating system used on the 1911 car to a forced system with a constant level splash. A Rayfield carbureter is used and the wheelbase has



SCHACHT TWO-PASSENGER ROADSTER AND THE R. C. H. RUNABOUT



MARION COLONIAL TYPE COUPE AND THE KING WITH ODD-SHAPED CLOSED BODY

been increased 1 inch, making it 114 inches. In place of the aluminum cone clutch used last year a pressed steel clutch is employed in which is incorporated an automatic adjusting spring. A five-passenger and four-passenger touring body as well as a seven-passenger roadster are supplied on this chassis at a decrease in price of $250 from last year's list. The six-cylinder model has 4 by 5-inch cylinders cast in pairs, 130-inch wheelbase, and 36 by 4½-inch tires. A seven-passenger fore-door touring body is supplied. In other respects the six-cylinder chassis is the same as its smaller brother. All the bodies are hung lower for this year and the back seat is designed to be 3 inches wider.

DeTamble

Three new models have been added to the DeTamble line, known as M, K and L, M being a two-passenger torpedo, K a five-passenger torpedo and L, another five-passenger. Changes noted over 1911 construction are in the nature of refinement. Where semi-floating rear axle was used last year, there now is the full floating type, while demountable rims are fitted in place of quick detachable. Side control has been abandoned in favor of center control and the pedals are adjustable, whereas last year they were not. There only is one chassis, that carrying a four-cylinder 36-horsepower motor of the L type and cast in pairs. The bore is 4¼ inches and the stroke 5, while there are other details such as dual system of ignition, multiple-disk clutch, lubrication effected by means of a constant level self-sustained with circulation by a plunger pump to all motor bearings and gears. A centrifugal gear-driven pump aids in the cooling. The wheelbase is 116 inches.

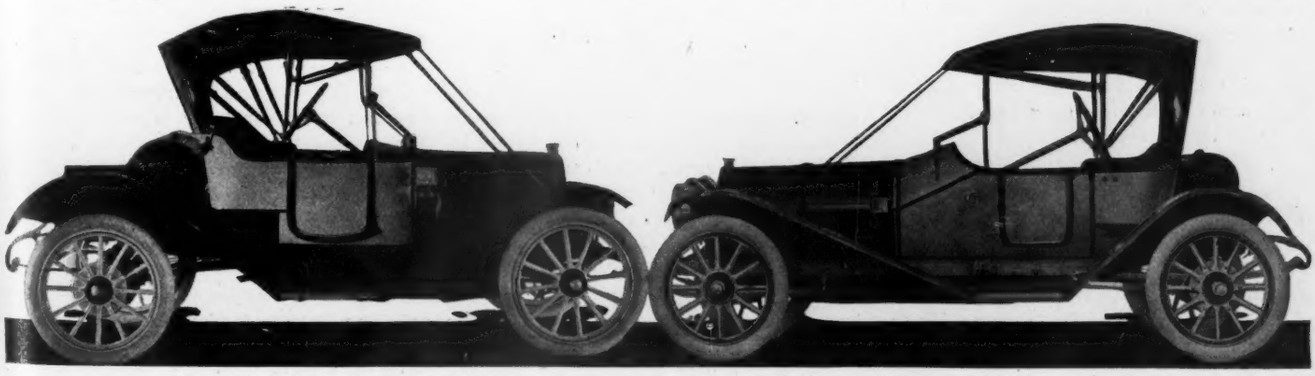
Cutting

For the season of 1912 two new models have been added to the line, two have been dropped and three are continued with such slight improvements and refinements that another year's developments have made practicable. The two models that have been added are the T-35, a five-passenger touring car with a 4 by 5-inch motor, and 34 by 4-inch tires; and the T-55, a five-passenger touring car with a 4¾ by 5½-inch motor, and 36 by 4-inch tires; each has a wheelbase of 116 inches. The models that have been discontinued are the E-30 and the E-50, both four-passenger torpedo touring cars.

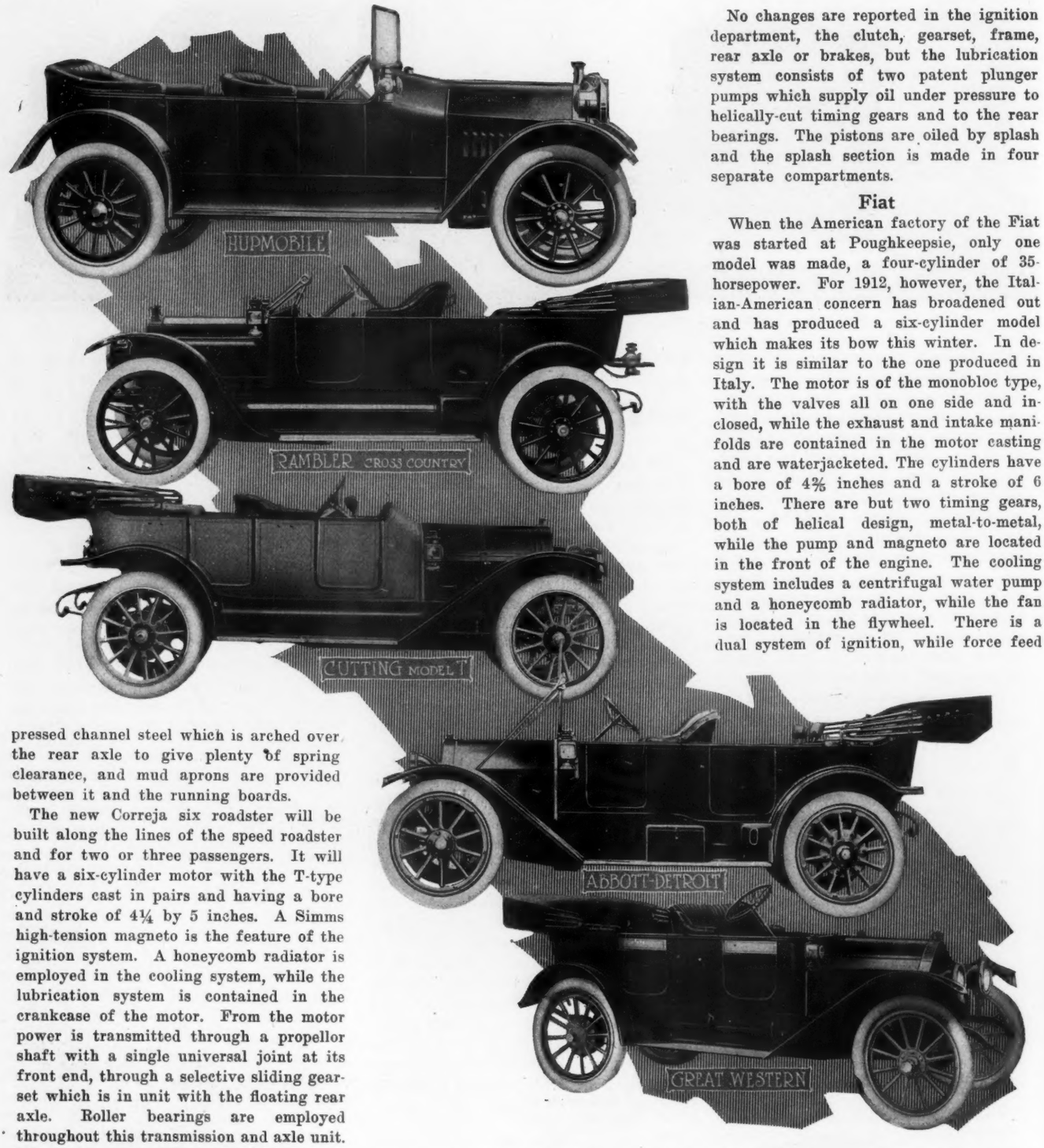
As for the models A-30, D-40 and F-60, which are standard constructions, the A-30 has a new motor in which the bore has been increased from 3¾ to 4 inches, valve-operating mechanisms all are inclosed, and a pump is provided in the cooling system converting it from a thermo-syphon into a forced water circulating system. By using seven plates instead of five in the clutch, improved and easier operation is obtained in starting the car, and the gearset has been improved by mounting its shafts on ball bearings instead of the plain ones previously employed. An improved rear axle design has been adopted, and the efficiency of the brakes has been increased by enlarging the brake drums 2 inches. To facilitate control of the car, the levers are arranged inside of the body instead of outside; there is more rake to the steering column and it is longer; and there are individual pedals for the clutch and service brake instead of one pedal for both. Five passenger touring bodies of the torpedo type may be fitted to this chassis, and all Cutting cars for 1912 are trimmed with nickel and black enamel.

Correja

For the season of 1912 the Correja car is made in three four-cylinder models including the regular speed runabout, a coupe, a new torpedo touring car and a new Correja six roadster and torpedo touring for four, five or seven passengers. The only changes that have been made for 1912 on the speed runabout are the addition of equipment including a self-starter. The new torpedo touring car has the same equipment except that the top is not included. A feature of the Correja cars for 1912 is the new design of differential brake equalizers employed. The power and transmission mechanism of this car are arranged in two units, the motor with its cone clutch contained in the flywheel comprising one unit which is suspended by steel arms attached directly to the side frame members; there is a double universal joint between the clutch and the propellor shaft which is inclosed in a torsion tube whose front end rests in a yoke hinged to a heavy arched cross member of the frame. The propellor shaft, torsion tube, transmission gearset, and axle comprise the second unit of the power and transmission system. The frame is of



WARREN 12-35 AND CUTTING R 30, TWO 1912 ROADSTERS



pressed channel steel which is arched over the rear axle to give plenty of spring clearance, and mud aprons are provided between it and the running boards.

The new Correja six roadster will be built along the lines of the speed roadster and for two or three passengers. It will have a six-cylinder motor with the T-type cylinders cast in pairs and having a bore and stroke of 4¼ by 5 inches. A Simms high-tension magneto is the feature of the ignition system. A honeycomb radiator is employed in the cooling system, while the lubrication system is contained in the crankcase of the motor. From the motor power is transmitted through a propellor shaft with a single universal joint at its front end, through a selective sliding gearset which is in unit with the floating rear axle. Roller bearings are employed throughout this transmission and axle unit. Wheels are equipped with 36 by 4-inch tires on demountable rims. There are two complete sets of internal and external brakes acting on the rear wheel drums; and the wheelbase is 125 inches.

Firestone-Columbus

The Firestone-Columbus people believe that even if no mechanical changes are needed from year to year, that there should be a difference in bodies and for that reason the 1912 fashions in bodies show material differences from last season. There have been three new models added to the line and two dropped. There are two engines also, one 4½ by 5½ with the cylinders cast in pair and the other a 4⅛ by 5¼-inch en bloc creation.

One of the new models is a doctor's special which seats three persons vis-a-vis. It has a new style top that completely incloses the pasengers. This car is equipped with a 30-horsepower motor. Then there is a seven-passenger car with the 4½ by 5½-inch motor which runs on 36-inch wheels and is fitted with demountable rims. Two of the 1911 four-passenger models have been dropped but this is partly made up by the addition of a light five-passenger model which uses the 4⅛ by 5¼-inch motor.

No changes are reported in the ignition department, the clutch, gearset, frame, rear axle or brakes, but the lubrication system consists of two patent plunger pumps which supply oil under pressure to helically-cut timing gears and to the rear bearings. The pistons are oiled by splash and the splash section is made in four separate compartments.

Fiat

When the American factory of the Fiat was started at Poughkeepsie, only one model was made, a four-cylinder of 35-horsepower. For 1912, however, the Italian-American concern has broadened out and has produced a six-cylinder model which makes its bow this winter. In design it is similar to the one produced in Italy. The motor is of the monobloc type, with the valves all on one side and inclosed, while the exhaust and intake manifolds are contained in the motor casting and are waterjacketed. The cylinders have a bore of 4⅘ inches and a stroke of 6 inches. There are but two timing gears, both of helical design, metal-to-metal, while the pump and magneto are located in the front of the engine. The cooling system includes a centrifugal water pump and a honeycomb radiator, while the fan is located in the flywheel. There is a dual system of ignition, while force feed lubrication is employed. Other features are an internal multiple-disk clutch, a double-jet Fiat carbureter, four-speed gearset with direct on fourth, and the gears and shafts are made of crucible chrome nickel alloy. The crankshaft is supported by four bearings of babbitted bronze, while the other anti-friction bearings are R. I. V. annular bearings.

The axle and drive shaft system is inclosed in a two-piece pressing of alloy steel and strut; torsion or brace rods are eliminated. The rear axle, of the semi-floating type, is inclined to prevent spreading of wheels. The wheelbase on the six

is 135 inches and the tire sizes are 36 by 4½ in front and 37 by 5 in the rear. Body styles include a seven-passenger fore-door touring car, a five-passenger phaeton, a two or four-passenger runabout, a fore-door limousine and a landaulet. Only a few minor changes are found in the Fiat four.

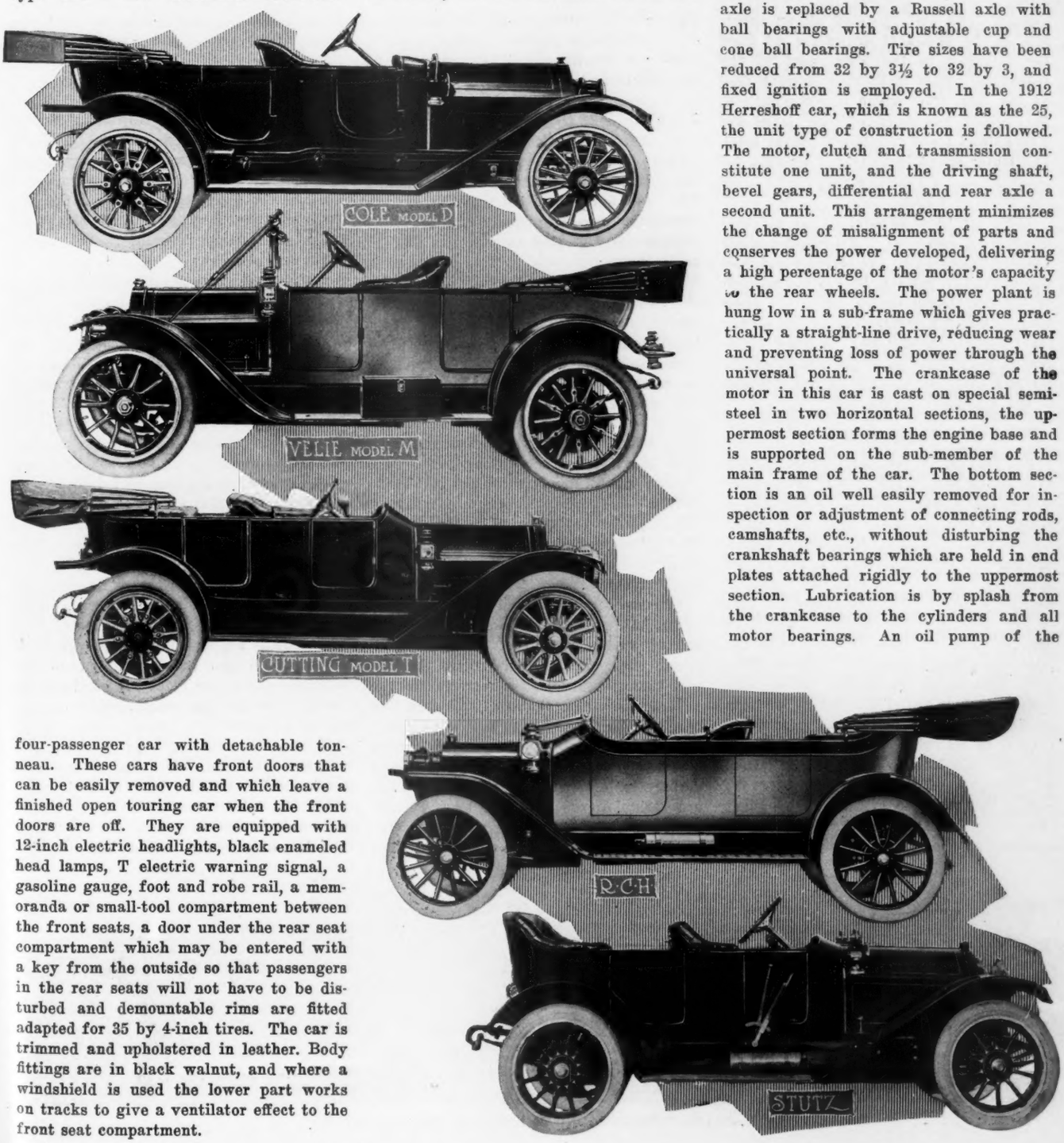
Great Western

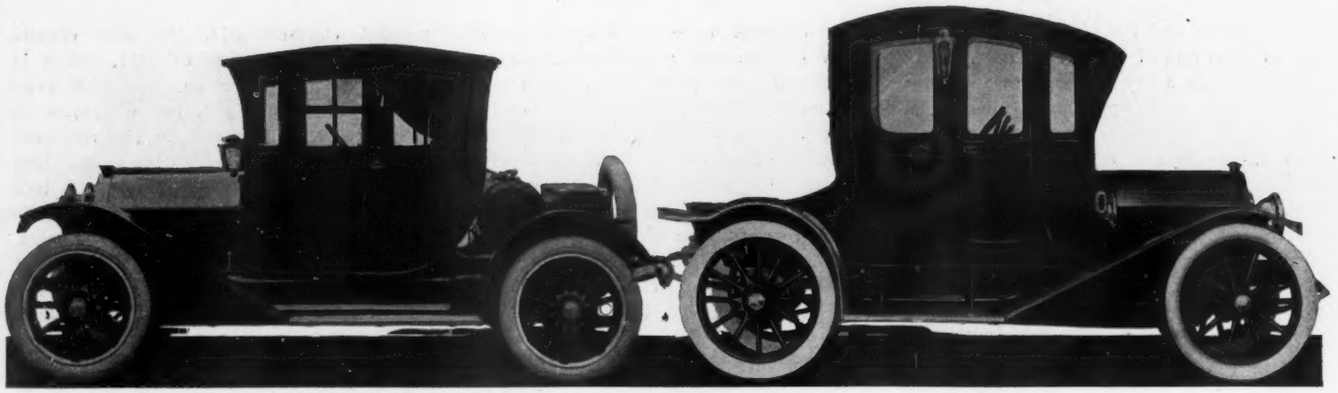
For the season of 1912 the Great Western continues building its open door touring cars, roadsters and semi-torpedoes, as well as a full torpedo patterned after the English type of cars. The company has added a new detachable fore-door body type and a new detachable front-door four-passenger car with detachable tonneau. These cars have front doors that can be easily removed and which leave a finished open touring car when the front doors are off. They are equipped with 12-inch electric headlights, black enameled head lamps, T electric warning signal, a gasoline gauge, foot and robe rail, a memoranda or small-tool compartment between the front seats, a door under the rear seat compartment which may be entered with a key from the outside so that passengers in the rear seats will not have to be disturbed and demountable rims are fitted adapted for 35 by 4-inch tires. The car is trimmed and upholstered in leather. Body fittings are in black walnut, and where a windshield is used the lower part works on tracks to give a ventilator effect to the front seat compartment.

No changes have been made in the motor except that a Presto self-starting mechanism has been fitted as regular equipment. The steering gear of the Great Western car now is mounted above the frame instead of below it, which gives more of an angle to the steering post, and a new type of control lever which is brass plated throughout and of better design than previously used is provided. In general the Great Western line shows a refinement in keeping with the progress of the industry.

Herreshoff

The Herreshoff company is bringing out an entirely new car for 1912. As for the general characteristic, the new chassis greatly resembles that of 1911, but it is lighter in construction, has left-hand drive instead of right, the wheelbase is shortened to 100 inches in the runabout and 105 in the touring. In the motor plain bearings now are used instead of ball bearings. There are more plates in the clutch than were previously employed, so that greater efficiency may be obtained therefrom. The shafts of the gearset are mounted in plain bearings instead of ball. A new Herreshoff design of axle, with Hyatt roller and ball thrust bearings employed therein, now replaces the design that was previously used. The former front axle is replaced by a Russell axle with ball bearings with adjustable cup and cone ball bearings. Tire sizes have been reduced from 32 by 3½ to 32 by 3, and fixed ignition is employed. In the 1912 Herreshoff car, which is known as the 25, the unit type of construction is followed. The motor, clutch and transmission constitute one unit, and the driving shaft, bevel gears, differential and rear axle a second unit. This arrangement minimizes the change of misalignment of parts and conserves the power developed, delivering a high percentage of the motor's capacity to the rear wheels. The power plant is hung low in a sub-frame which gives practically a straight-line drive, reducing wear and preventing loss of power through the universal point. The crankcase of the motor in this car is cast on special semi-steel in two horizontal sections, the uppermost section forms the engine base and is supported on the sub-member of the main frame of the car. The bottom section is an oil well easily removed for inspection or adjustment of connecting rods, camshafts, etc., without disturbing the crankshaft bearings which are held in end plates attached rigidly to the uppermost section. Lubrication is by splash from the crankcase to the cylinders and all motor bearings. An oil pump of the





TWO TYPES OF COLONIAL BODIES, THE STUTZ AND THE ABBOTT-DETROIT

plunger type and operated off an eccentric on the camshaft draws the oil from the reservoir in the lower part of the crankcase, forces it through a sight feed on the dash from which it flows back to the splash chambers of the crankcase where stand pipes maintain constant level. The motor speed is regulated by foot accelerator and a hand-controlled lever over the steering wheel.

There are three brakes, one an external contracting band on the propellor shaft which is operated by the clutch pedal, and two internal expanding brakes one on each of the rear wheel drums which are operated by another pedal. The brakes on the rear wheels are entirely inclosed. The gear-shifting lever is in the center of the car and mounted directly on the rear end of the transmission gearcase.

Hupmobile

The feature of the Hupmobile line for 1912 is the new 32-horsepower touring car which has a bore of 3¼ inches and a stroke of 5½ inches. This new motor differs from the 1911 Hupmobile engine not only in that the stroke is 2⅛ inches longer but there are in fact two points of similarity between the new model and that of the 20-horsepower motor. The motor has its cylinders cast en bloc with the inlet and exhaust manifolds integral therewith. The valve mechanisms are inclosed and the valves are eliminated by a single readily removable plate that gives convenient to all valve chambers at once. A flywheel circulating splash oiling system is employed. The timing gears of the engine and magneto are driven by silent Coventry chains; and the magneto is mounted on the top of the flywheel housing in a way that brings its distributor in a convenient position in front of the dash. A spark control is provided and both spark and throttle levers and a means of regulating the air to the carbureter are arranged centrally on the edge of the cowl that enshrouds the dash. As for the 20-horsepower car brought out in 1911, many refinements in detail are to be found. The axleshafts are babbitted near the brakes to prevent grease from escaping. Brakes are increased in diameter from 8 to 10 inches.

An adjustable ball housing is provided for the universal joint. All spring hangers are fitted with oilers. Timken roller bearings are used in the front wheels. A new radiator is used which is claimed to be a third more efficient than the one previously employed. There is an improved water outlet on the engine. Radius rods have square lock nuts on the transmission ends to make them more easily adjustable. Double springs are fitted to the foot-brake pedals. A steel flywheel guard is fitted. Mud guards are increased in size from 6 to 9 inches in width, and mud shields complete the inclosed space between the frame and fenders.

The magneto is incased in a Rubbertex cover, hub caps are of brass, timing gears are of bronze instead of fiber, valve-adjusters are provided to maintain the correct timing and noiseless operation of the valve-operating mechanisms; all cast iron used on the car is sand-blasted to give a smoother surface and keep grit out of gears and bearings. An improved Breeze carbureter is fitted. All side-door models are inside driven and fore-doors are included without extra charge.

All bodies used on the Hupmobile show great taste and are in keeping with the latest ideas as advanced for the season of 1912.

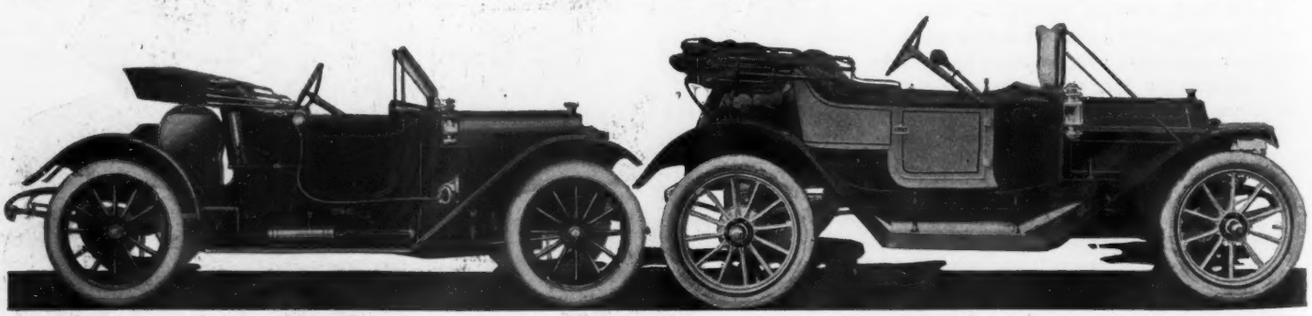
Imperial

Only two of last year's Imperial models are carried over, those being 50 and 51, which are continued with only a few minor changes. But there are four new Imperials which show the progress made in the last 12 months by this concern and which differ in many respects from the 1911 styles that were put out.

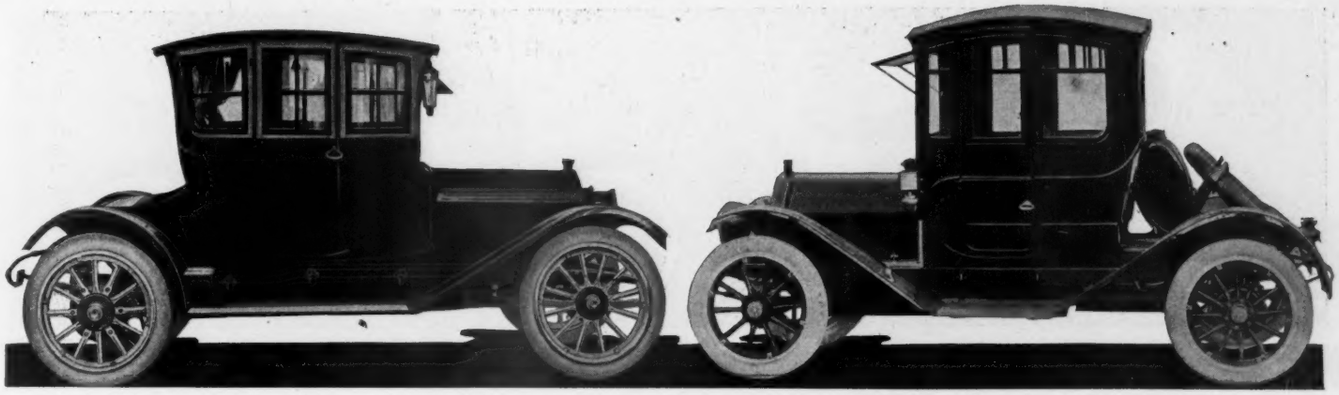
In the four new ones there are three different sizes of engines used. On model 44 there is a long-stroke motor, the figures being 4½ by 5¼; model 34 has a 4⅝ by 5¼ motor and 32 and 33 4⅛ by 5¼. On each there is a unit power plant, whereas this is not to be found in models 50 and 51. Another feature is center control, while demountable rims make another talking point. Torpedo bodies have found high favor with the Imperial designer.

Whereas the 1911 cars used a semi-floating rear axle, the new product, model 44, has one of the full floating type. Also there is a difference in the springing, the front spring hanger on the rear spring not being fastened tight as in 1911, which permits it to swing freely on its shackle. The rear axle is supported in its proper position by the two rods going out to the other side from the front end of the third member to the underneath side of the spring hanger.

The motor on 44, 4½ by 5¼, has the pushrods inclosed, while the valves are mechanically operated from a single camshaft. The lubrication is effected by means of a self-contained system, the oil being circulated by being carried from the fly-



LION 40 AND FIRESTONE-COLUMBUS 78-8, TWO ROADSTERS



MODEL I COLE AND VELIE 40 WITH COUPE BODIES

wheel into the chambers. The thermo-syphon system of cooling is used. The wheels are 36 by 4. The wheelbase is 120 inches; on the 34 it is 116; on the 32 it it is 114, the same as on 33, which is the two-passenger roadster.

Krit

The new Krit models for 1912 are model KR or K roadster, model Kt or K touring car and model KD or K covered delivery wagon. A change in these models, outside of the body fender design and equipment, is longer wheelbase, 106 inches against 96 inches of the original model A runabout, which the company still continues to build in conjunction with the underslung model U. The frame of the new model is heavier, being 3½ inches instead of 3-inch section. It is offset in front and raised over the rear axle. There are two full elliptic springs in the rear instead of the cross spring as used on the models A and U. These elliptic springs are attached to the under side of the rear axle which is claimed to give the car exceptionally easy riding qualities.

The control of the car is different in that the gearset is three speeds ahead and one reverse and its lever operates in an H quadrant. Brakes are larger, being 10 inches in diameter and having a 2-inch face. They are of the internal and external type both on the rear wheels. The chassis is equipped with demountable rims while the model A chassis has clincher rims. The motor remains the same except that the magneto mounting has been changed so that instead of the driving gear being mounted directly on the magneto and in the housing, the gear is mounted on a shaft which carries a compact jaw coupling of Krit design. The magneto connection is a flanged coupling fastened to the armature shaft. This enables one to take the magneto off very quickly. There is a stuffing box between the gear and magneto to prevent any leakage of oil; and a flanged coupling, the hub of which forms the bearing for the stuffing box, carries a sling collar so that if any oil should leak by the stuffing box it will be thrown away from the magneto shaft, thereby preventing it from interfering with the operation of the magneto. This feature and a slight change in the top water tap, which is a one-piece casting fastened with four hexagon head bolts instead of sixteen screws as formerly, completes the changes in the motor. The principal change in the model A has been in the provision of larger brakes and stronger rear axle gears; while the fore-door bodies now use wider fenders.

Klinekar

The 1912 Klinekar models constitute an advance along the same lines that have been characteristic of Klinekar construction in previous years. There are no radical changes but higher efficiency in motive power is claimed to have been obtained by simplifying and strengthening the construction, adding comfort in appointments and beauty in design. Klinekars are built in four distinct chassis, which are known as models 6-60, 6-50, 4-40 and 4-30. On these chassis are mounted two, four, five, six and seven-passenger bodies of various types.

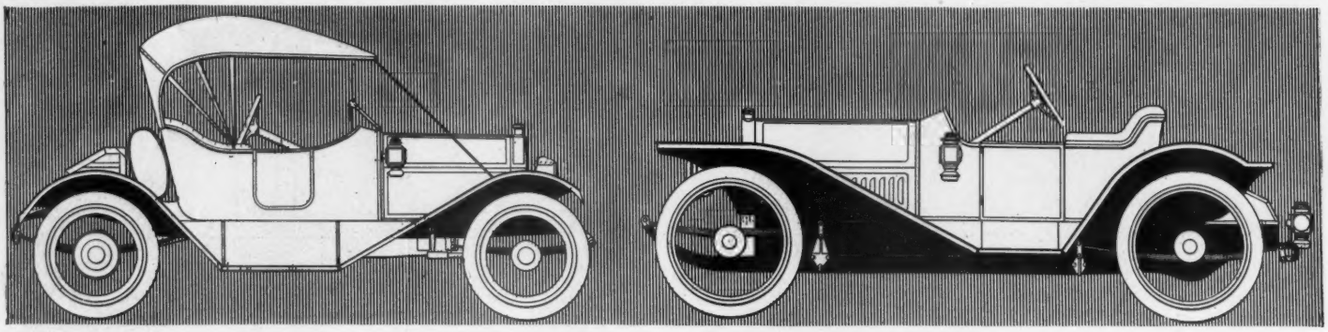
As for the changes, new features and equipment of the 1912 models, the model 6-60 wheelbase has been lengthened, and it carries a larger flush-side body which is equipped with ventilators and generous doors front and rear. The upholstering is deeper, softer and more luxurious, and the cushions are tapered to the rear, giving the occupants a more comfortable position at all times. The extra chairs in the touring car are larger and so designed that they disappear under the front seats when not in use and are entirely out of the way. A clear-vision type glass front has been added and an improved silk mohair semi-duquesne top with side curtains and dust hood are included in the regular equipment. The tire sizes have been increased so that the front wheel sizes are applicable to the rear, and the tires are mounted on quick-detachable demountable rims with one extra rim. Special tire iron equipment with black finish has been designed and is bolted to the frame. Gas lamp sizes have been increased. These lamps are finished with black body and brass trimmings, with all brass optional.

In addition to these changes and refinements, the other three models have been fitted with gearsets giving four forward speeds, and the semi-floating rear-axles previously used on models 4-40 and 4-30 now are replaced by floating type axles.

King

The unique King car introduced to the motoring public during the season of 1911 remains mechanically unchanged for 1912. The line comprises three models: a touring, roadster and coupe, all of which are built on the same chassis. The coupe is the latest product of the King company. It is finished with nickel trimmings throughout; is equipped with a Disco acetylene self-starter; has electric side and tail lights and gas headlights; a Standard speedometer is fitted; and one of its best features is an adjustable driver's seat which may

CORREJA FORE-DOORED TORPEDO ROADSTER AND THE RAMBLER RUNABOUT



IMPERIAL RUNABOUT AND REGAL TWO-PASSENGER ROADSTER

be pulled forward so that a woman may drive the car, or shoved back to give room for a long-legged man. It is upholstered in leather; has left-hand drive with the gear-shifting lever in the center; and it seats three passengers comfortably. A new patent windshield is a feature of the equipment on the touring and roadster models.

The King motor car is unique because of the simplicity and originality of its design. The four cylinders of the motor are cast en bloc and integral with the upper half of the crankcase. The exhaust pipe also is an integral part of the cylinder casting; and the inlet manifold is incorporated in the plate that covers the valve-operating mechanisms. Valve openings are 1⅛ inches in diameter, and the valves are placed on an angle so that they open directly into the cylinders, thus giving extremely short line of travel and minimum exposed surface in the combustion chamber. Spiral-drive timing gears are used to eliminate noise; and the air intake for the carbureter is at the top of the valve-spring chamber to muffle the suction noise of the carbureter. The entire motor is exceptionally free from exposed mechanisms. Many parts have been saved by combining the duties of several. For instance, the breather pipe is placed at the front of the motor and besides relieving the crankcase pressure it acts as the oil-filling tube and fan standard. It also is so constructed that one side serves as a cover for the front end gears. The front frame cross member does seven duties. The clutch and gearset are combined with the motor to form a unit power plant; a propellor shaft in a torsion tube transmits power to the floating rear axle; the front axle is a pressed channel steel structure with drop-forged steering knuckles; and the King patented rear spring suspension is one of the most unique features.

Lion

Carrying over its model H in its 1911 form, the Lion company has added another chassis which is known as model K, for 1912, which differs from the H only in the way of refinements and equipment and in price. There has been a drop in the list on H, which now comes equipped. The model K uses the same engine as H, but is built 4 inches lower and has a wheelbase of 116 inches, which is 4 inches longer than is found on H. The springs, too, are longer, being 50 inches in length, whereas on H they are 42. Another refinement found on the new model is a self-starter, a Victor, while Booth demountable rims also are something new. The hood has been lengthened 4 inches, the back seat on the touring car has been widened, while in the way of brakes there are double internal expanding ones fitted instead of having one inside and the other outside.

Mechanically the Lion uses a four-cylinder motor of the L type with the exhaust valves in the head and the bore and stroke 4½ by 5 inches. There is Kingston low-tension double ignition, a unit power plant and a Hess-Bright full floating rear axle with roller bearings in the steering knuckles.

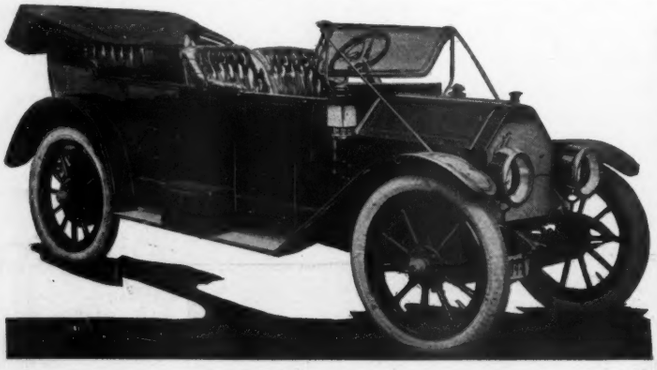
Metz

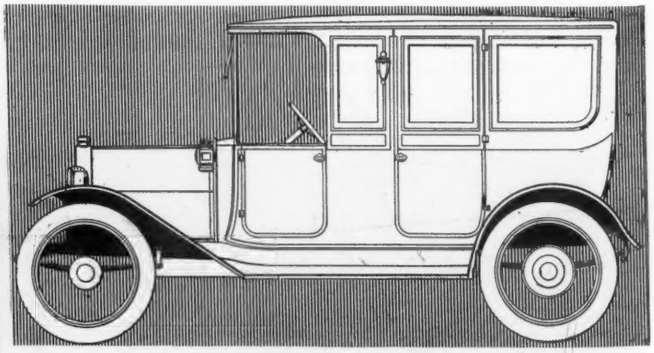
The Metz goes into the show changed but little from its 1911 form; in fact, the casual observer will note few changes and those only in the matter of refinement. The Metz is one of the lightweights, for fully equipped it weighs only 1,000 pounds. It is a two-passenger proposition and secures its power from a four-cylinder en bloc motor with a bore of 3¾ inches and a stroke of 4 inches, which gives it a rating of 22 horsepower. It is water-cooled, has the splash system of lubrication but differs from the conventional in that it is operated by friction drive which gives five changes of speed. Elliptic springs are used front and rear and throughout the car it is evident that the designer has kept abreast of the times.

Marion

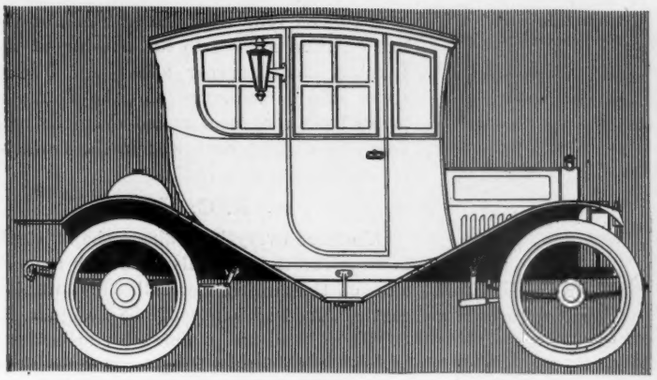
A long-stroke four-cylinder motor more powerful than in the previous line and the fitting of the Prest-O-Lite self-starter on the two 35-horsepower models are the Marion talking points this year. The new motor is the equipment of model 48 and comes with a bore of 4⅛ inches and a stroke of 5½, and the cylinders are cast in pairs. The rating is 45 horsepower; the cooling is by means of a centrifugal pump; the lubrication scheme is the constant-level sump system, operated by means of a gear pump which is worm-driven. There is a cellular type radiator and cone clutch.

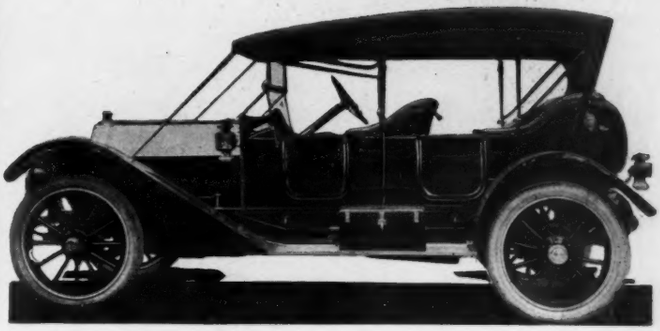
A crankshaft larger than usual is fitted, the dimension being 2¼ inches in diameter, with the rear main bearing 4⅛ inches long, the center bearing 3 inches, the connecting rod bearing 2½, the hollow piston pin 1¼ in diameter, 4 inches long, 5-32 inch thick and weighing 9 ounces. The connecting rod itself weighs 3¾ pounds and the piston 4 pounds. The cylinders and piston are ground to size and the pis-





FIRESTONE-COLUMBUS SEVEN-PASSENGER AND FIRESTONE LIMOUSINE





HERRESHOFF COUPE AND McFARLAN TOURING CAR

ton is fitted with a device to keep oil from going past the explosion chamber. The camshaft is one-piece, 1 inch in diameter and runs on three bearings, giving a total surface of 9 inches. To secure alignment and eliminate noise the large gear is bolted to a flange. Side slap of the pushrod is eliminated by fitting a large diameter roller at the lower end. The valves are 2¼ inches in diameter and the lift is ¼ inch. The valve stems are inclosed.

As for the other features of this chassis, it has 120-inch wheelbase, double drop frame, 36 by 4 wheels, I-beam front axle and full floating rear, twin internal expanding brakes and three-speed gearset. Noted on the lower-powered chassis is left hand control. The engine is 4 by 4½, with offset cylinders, thermo-syphon cooling, and mechanical force feed oiler.

There has been a refining of the body lines and the new styles include the fore-door idea brought up to the minute by the designers in the Marion factory.

McFarlan

The house of McFarlan pins its faith exclusively to sixes and comes out for 1912 with two models, one of which is a new one and the other a continuation of last year. The McFarlan little six has been abandoned and in its place is a 40-45-horsepower model, features of which are a wheelbase which is 1 inch longer than was found on the little six, while a rear axle unit transmission has been adopted by this concern.

The 55-60 horsepower model has been continued, and the only difference between 1911 and 1912 is that the bore of the motor has been increased ¼ inch and the price increased, which latter fact is explained by the equipping of a self-starter, shock absorbers, speedometer and other necessary equipment. Both these models have self-starters of the compressed air type.

On the 45-50 the bore and stroke are 4 and 5 inches respectively, and the cylinders are cast in blocks of three, the engine being of the T-head type, and with the valves in opposite sides. The lubrication is splash, the ignition high-tension and of the dual system; the clutch multiple-disk; the brakes double expanding; the wheelbase 124 inches; demountable rims are fitted; the front springs are semi-elliptic and the rear elliptic, with double scroll ends.

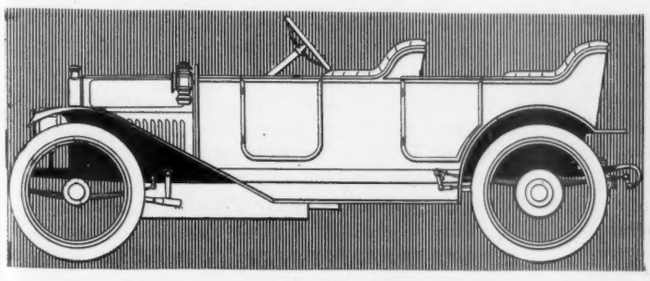
The 55-60 now has a bore of 4¼ inches and a stroke of 5 and differs from its smaller brother in that the engine is of the valve-in-head type.

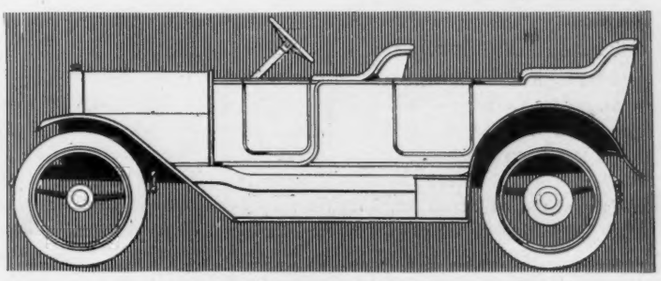
Paterson

The only car the Paterson company has carried over from 1911 is the model F roadster. This is built on the same chassis as in 1911, but the body and finish are considerably improved for 1912. The model 45 is strictly a new car which the company started turning out in 1911. The model 45 differs from the 40 of last season in that it has a larger motor, a multiple-disk clutch, floating instead of a semi-floating rear axle, 36 instead of 34 by 4-inch tires; and the wheelbase has been lengthened from 118 to 120 inches. The car is fully equipped. In designing the model 45 an effort has been made to meet every requirement in the way of power, speed and comfort. The tonneau is exceptionally large and roomy, and is equipped with auxiliary seat brackets so that it can be easily converted into a seven-passenger car. Like all Paterson models heretofore built, the new model has a unit power plant. The motor of this power plant has the valve mechanisms inclosed by easily removable plates, and patented valve guides that prevent any oil from escaping through them. A self-contained constant level splash lubrication system is employed in which the lower part of the crankcase is divided into four pockets or compartments, so that each cylinder will receive an ample supply of oil regardless of the incline of the car. The oil is distributed from the oil reservoir to these different oil compartments by the flywheel.

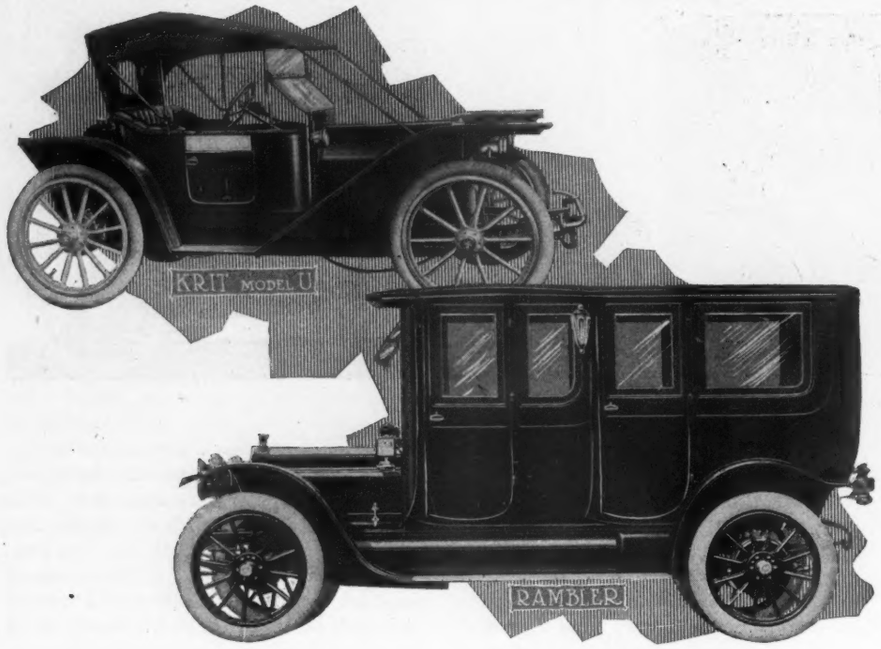
Paige-Detroit

A summary of the changes, improvements and refinements to be found in the Paige-Detroit cars for 1912 will serve to show that considerable of an effort has been made to increase their efficiency and facilitate their operation and maintenance. On the 1912 cars the inlet manifold is cast integral with the cylinder, so that it may be warmed by the water jacket. Valve mechanisms are inclosed to protect them from dust and dirt, to facilitate cleaning and promote noiseless operation. The exhaust pipe is redesigned so that it now permits of a freer flow of the gases therethrough, the crankcase has been remodeled so that the hand hole plates on either side may be removed without disturbing the valve timing; and the camshaft bearings are now held in place by metal straps. The oil pump or reservoir now may be removed independently, and it is driven by an eccentric instead of a cam, while the sight feeds on the dash have been discarded and sights placed on the motor crankcase. Crankshaft adjustments are provided on the rear end of the crankshaft for end thrust, and a hard thrust washer





TWO TYPES OF TOURING CARS, THE HERRESHOFF AND FIRESTONE-COLUMBUS



is fitted to take the clutch thrust. The clutch spindle now is fitted with roller bearings instead of a plain bronze bushing; the clutch is 1½ inch larger in diameter and has one-half again as much friction surface; four springs instead of three are used to engage the clutch which makes for smoother operations, the springs are longer and can be more readily adjusted; ten steel plates with cork inserts are used instead of twenty-four alternately bronze and steel ones; and instead of carrying the disks on studs they now are carried in milled grooves.

In the gearset the pitch of the gears is increased from 8-10 to 6-8, making them heavier and stronger while more clearance is provided the gears when in neutral position. As now designed the rear end of the gearset can be removed with the square shaft and universal joint intact. The chassis springs are stiffer. The steering wheel is 1 inch larger in diameter; the throttle tube is inclosed in the steering column. By using drop forged control levers instead of malleable castings the control levers have been stiffened up; and a bronze bushing has been fitted in the gear-shifting lever which facilitates shifting it. In the cooling system the radiator is 2 inches wider and 1 inch higher and the fan is attached to the cylinders of the motor instead of to the radiator. In this way the cooling efficiency has been increased.

Rambler

Although there have been many detailed changes in the way of refinements made in the 1912 Rambler line, the refinements have not been confined to the chassis, the body and its equipment having come in for a fair share of attention in this respect. The 1912 line is built on three chassis sizes, all of which are alike in general construction but different in motor sizes, wheelbases, wheel sizes, springs, etc. On these chassis but two motor sizes are used, namely, a 4½-inch square motor and a larger one with a 5-inch bore and a 5½-inch stroke.

One of the most important changes is a rearrangement of the motor appurtenances so that now the water pump, lubricator and magneto are on the left side. The water pump now is in the rear of the cross piece forming the front motor support and the magneto and lubricator have changed positions, the magneto being at the rear which offers a convenience in supporting the wiring outfit.

Another change is that that fan now is driven by a leather belt from a pulley on the end of the pump shaft, whereas heretofore it was driven by a pulley on the crankshaft. The lubricating system has been improved in that the oiler is now a seven-feed type with four oil tubes leading to the four cylinders and the remaining three to the crankshaft. In bearings and the ignition system the swinging lever connections have been discontinued and the high-tension cables are connected by standard terminals to the spark plug.

This year three-quarters elliptic springs are employed in the rear instead of the seven-eighths design of 1911 and heavy gusset plates are now used at the rear corners of the frame to re-inforce it and serve as an attachment for the springs. Except for these changes and perhaps a few other slight improvements the general characteristics of Rambler design are maintained.

The motor is a vertical L-type with the cylinders cast separately. An expanding band clutch is employed which is applied to the flywheel of the motor and completes one section of the power and transmission system. The other section of this system, which is connected by a short shaft, is composed of a three-speed selective gearset mounted at the forward end of a torsion tube with the rear end of the torsion tube secured to the housing of the Rambler floating rear axle. An I-beam front axle is employed and the frame is pressed channel steel raised over the rear axle and slightly narrowed in the front to reduce the turning radius.

R. C. H.

Of course everything about the R. C. H. is new, for the car only made its appearance on the market last fall. This initialed car is named in honor of the designer, R. C. Hupp, and in a nutshell its leading characteristics are a long-stroke four-cylinder motor, inclosed valves, a three-speed gearset, cone clutch, Bosch magneto and low price. As a two-passenger runabout and as a four-passenger car it has a wheelbase of 86 inches, and as a touring car it is wheelbased at 110 inches.

The R. C. H. en bloc motor has a 3¼-inch bore and a 5-inch stroke, the lubrication being effected by means of the constant-level splash system. The Bosch magneto is on the left and the carbureter on the right. Another feature is accessibility, it being possible to remove the differential and bevel driving gears from the rear axle by removing the rear axle cover and pulling out the axle shafts, unbolting the springs and the lower universal joint housing and the rear axle can be removed, which gives access to the transmission. The timing gears can be reached by removing the radiator and cover on the front of the engine, while the clutch also is easily taken out without the necessity of touching the engine or rear axle. Another feature is the location of the control lever in the center. The driver sits on the left side, which places the lever at his right.

In designing the body the aim was to follow closely the English on the runabout which has the high fore-doors so popular on the other side. Dark red and black is the color combination.

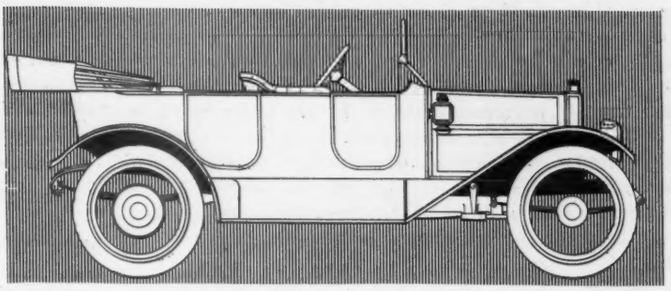
Regal

For the season of 1912 the Regal is offering four moderate-priced models of the underslung type which are characterized by an L-type, water-cooled motor, a leather-faced cone clutch, a propellor shaft enclosed in a torsion tube having its rear end rigidly connected to a three-speed selective gearset that is bolted in unit with a semi-floating rear axle; an I-beam front axle and semi-elliptic springs to support the pressed channel steel frame.

The roadster and coupe body are continued on almost the identical chassis which appeared for 1911. The innovations in the Regal line comprise two underslung touring cars known as the model T or 25 and the model H or 35, the former having an en bloc motor and the latter a motor whose cylinders are cast in pairs.

As for the changes in the model 30 which is continued over for the season of 1912 there are practically none except that easier riding qualities are claimed to have

been obtained by making the springs free on the rear axle and lengthening the wheelbase from 106 to 110 inches. As for the characteristic features of the new car they are for the most part particularly identical to those of the 1911 models. The model T is a graceful car of the smaller class having a wheelbase of 106 inches and is well suited for the city touring or suburban service. The Regal model H or 35 underslung touring car varies principally from the 25 in the size of its body and the power of its motor. The length of the wheelbase is 118 inches. The crankcase is of the barrel type and is mounted on a tubular subframe. The inlet and exhaust valves are of large diameter, interchangeable and are located on the left side of the motor.



FORE-DOOR IMPERIAL TOURING CAR

Reading

For the season of 1912 the Reading offers three types of cars: A roadster, touring and fore-door touring car. These different styles of bodies are fitted to a single chassis which remains practically unchanged for the season of 1912. In the motor, for instance, there are no changes except that a Pittsfield magneto is used in the ignition system. The clutch has been enlarged in diameter, and a pressed steel heat-treated frame with a 6½-inch drop between the front and rear axle is used. Timken-Detroit axles have replaced the Middleby designs previously employed. Brakes have been enlarged so that they now operate on a drum which is 17 inches in diameter and 2½ inches wide.

The Reading 40 motor is of Middleby design and manufacture. It has four vertical water-cooled cylinders with a 5-inch bore and 6-inch stroke which are cast en bloc, so that there is no chance for the cylinders getting out of alignment under the strain of operation. The inlet and exhaust manifolds are cast integral with the cylinders, and there is a continuous waterjacket of large dimensions surrounding the four cylinders and valve chambers. This construction greatly reduces the number of parts required which makes for a simple and neat design. The cylinders are offset from the crankshaft to obviate the read center at the time of the explosion, and reduce the wear.

The crankcase is a two-piece aluminum casting, the top section forming the engine base and containing the five crankshaft bearings which are heavily rubbed and supported from the top of the crankcase. These bearings are fitted with pockets to receive a constant supply of oil from the oil pump while the motor is in operation. The lower section is simply an oil well provided with a large hand hole plate which is easily removable for inspection or adjustment of connecting rods, camshafts, etc. The oiling system is automatic in that a self-contained plunger pump forces the oil through a sight feed on the dash, then distributes it to the different bearings and gears.

Stutz

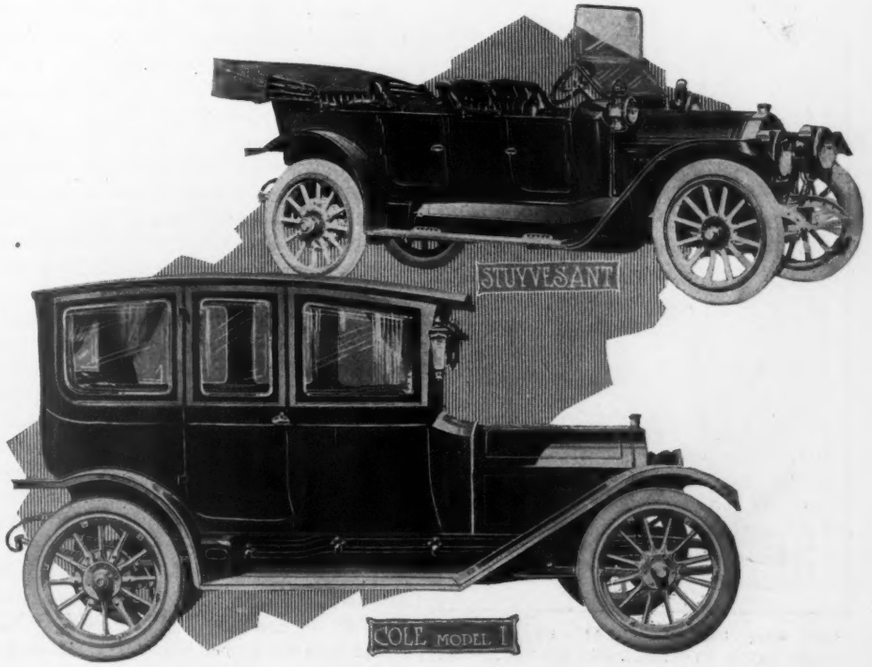
Although making its appearance during the summer of 1911 this is the first appearance at the shows for the Stutz. The first cars put out proved so satisfactory that for the new season there have been few if any changes; in fact, the only distinguishing mark between 1911 and 1912 is the inclosure of the valves. Only one chassis is made but with that there are five different body types—a five-passenger touring car, a four-passenger, a two-passenger roadster, a semi-racer and a coupe. The Stutz motor is of the T-head type, 4¾ by 5½ inches and different from the conventional in that the cylinders are offset ¾ inch. The cylinder and valve passages are waterjacketed and the water is kept in circulation by means of a pump.

The Stutz oiling system employs the hollow crankshaft idea by which the oil is pumped by means of a geared pump through copper tubes to the main bearings and then forced through the hollow crankshaft to the connecting rod bearings. Of course the Stutz rear system is used on the car, the transmission and rear axle being cast in one unit, the idea giving direct line drive and utilizing only one universal joint. All gears and shafts are of chrome vanadium steel, bone-hardened and ground, while all shafts are mounted on annular bearings. The rear spindles are 1½ inches in diameter and of chrome nickel steel. The gearshift mechanism is located parallel to the torsion tube for the purpose of preventing gears being thrown out of mesh. The brakes are of the twin internal expanding type; brake drums are 14 inches in diameter by 4½ inches wide. The front axle is a Timken of I-beam section.

The wheelbase of the Stutz chassis is 120 inches and the wheels are 34 by 4½ with demountable rims. Other features of the car include Eisemann high-tension dual ignition; cellular radiator, semi-elliptic springs in front and rear, with the Mercedes type of rear loop and double spring shackles; multiple-disk clutch and a low-slung body.

Schacht

Practically all of the 1911 Schacht models are continued for the season of 1912, and there has been added to the line a new model designated J-M, equipped with a standard fore-door touring car body. This new model has a 45-50 horsepower motor with a 4½-inch bore and 5-inch stroke, in which the cylinders are cast en bloc and the valve mechanism all inclosed. The transmission gearset is larger and heavier than on all the Schacht models, and the frame of the chassis has 4-inch side members, which is ½ inch heavier than those of other models. A full-floating axle with annular ball bearings in the rear hubs is used instead of the semi-floating type. Brakes are 14 inches in diam-



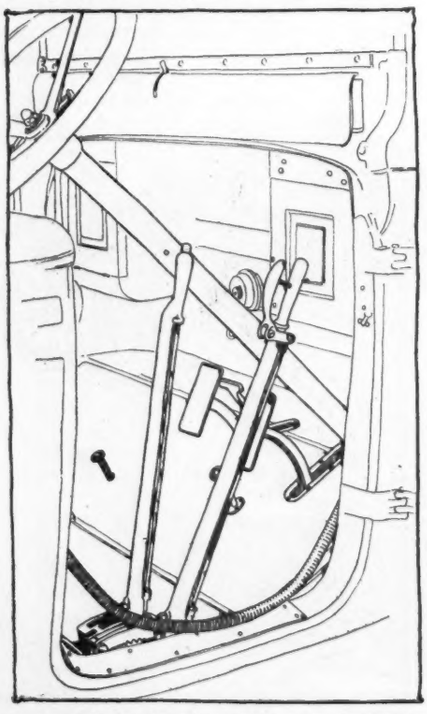
eter and are provided with equalizers. This model is built exclusively with the steering gear on the left-hand side and the control lever in the center of the car. The steering gear is equipped with ball bearings.

The motor of this new model is fitted with a self-starting mechanism, and a double ignition system in which a Mea magneto is the principal feature. All brass parts are nickel plated and there is included in the equipment a top, windshield, speedometer, gas tank, etc. A new eight-passenger car that the Schacht company has just designed is unique in that there are two seats in the tonneau which are arranged so that the occupants face each other. These seats are capable of carrying three passengers each so that with the two seats in front the car is capable of comfortably carrying eight passengers including the driver.

This car has a 136-inch wheelbase and is equipped with 35 by 4½-inch tires; otherwise the specifications are the same as on the model J.-M. Being of such an odd size as to carrying capacity, the car ought to attract attention.

Stuyvesant

The Stuyvesant car which makes its initial appearance for the season of 1912 is practically the old Gaeth car of 1911 rebuilt, improved and refined. The new car differs from the Gaeth, however, in that it has left-hand drive with center control lever; the transmission gearset gives four forward speeds and reverse instead of three; the propellor shaft is inclosed in the torsion tube and has but one universal joint at the forward end; a floating instead of semi-floating rear axle is employed; three-quarter rear springs are used in place of semi-elliptics; tires are 36 by 4½ inches front and rear instead of 4 inch front and 4½ inches in the rear; and there are many refinements and improvements of this nature to be found in the new Stuyvesant.



VIEW SHOWING PIERCE-ARROW METHOD OF LOCATING CONTROL INSIDE THE BODY

The chassis of all four of the cars is the same and the equipment is practically the same, except that the five-passenger and pony tonneau have a patent leather trunk on the rear. The equipment includes the Bosch multi-point dual ignition system which permits of firing of the T-head motor with a double set of plugs. An electric generator is provided which is driven from the motor and furnishes power for two large 12-inch headlamps on the front, two side lamps, and a tail light. The car carries a 150-ampere hour 12-volt storage battery and also an electric motor for starting the engine at the flywheel. Booth demountable rims are provided.

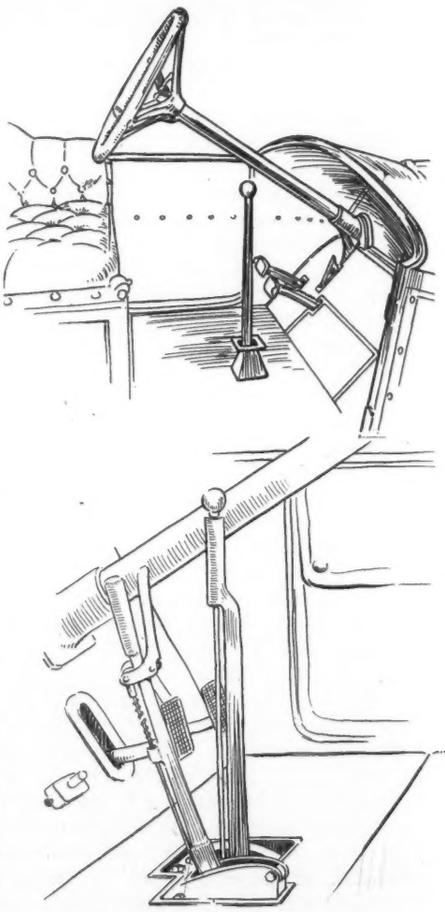
Velie

Inclosure of the valves and a self-starter on all models are the chief features of the three Velie chassis models for 1912. These three models are practically the same, the only difference being in the length of the wheelbase and the size of the wheels. The same motor and the same transmission are used in all. The four cylinders have a bore of 4½ inches and a stroke of 5¼ inches, and are of the L type, cast in pairs. The valves are on the left-hand side of the motor. So far the motor is the same as that used in the single chassis produced last year. This year, however, the valves are completely inclosed in a removable housing, so arranged that the valve cover can be removed by simply turning two milled nuts by hand. The base of the motor has been changed somewhat and is so arranged that the removal of the oil reservoir permits the pistons and connecting rods to be taken out through the bottom without dismantling the cylinders. The water pump is hung on trunnions on the motor base, so that lining up the pump and pump shaft is simplified. The water pipes have been increased in size in order to permit thermo-syphon action in case the pump goes wrong. All water connections to the motor are one standard size and are expanding lock connections in place of being bolted and fitted with gaskets to give greater accessibility and uniformity. The radiator has been increased 2 inches in height. The Splitdorf magneto, which is located at the front, is on the left-hand side of the motor instead of at the rear of the right-hand side, as in last year's model. The magneto, in conjunction with the Atwater Kent system of dry cells, forms a double ignition system.

One of the features of Velie construction for this year is the design of the magneto coupling. In place of the Oldham coupling for the magneto shaft and Atwater Kent distributor, two face plates are used, one of which has ten holes in its may be obtained by simply changing the connection at the coupling. A three-way switch permits either the Atwater Kent circumference and the other twelve holes, so that sixty variations in magneto timing system or the magneto system to be used, or both together. In the latter case a two-point ignition is obtained. The lubrication

EXAMPLES OF CENTER CONTROL

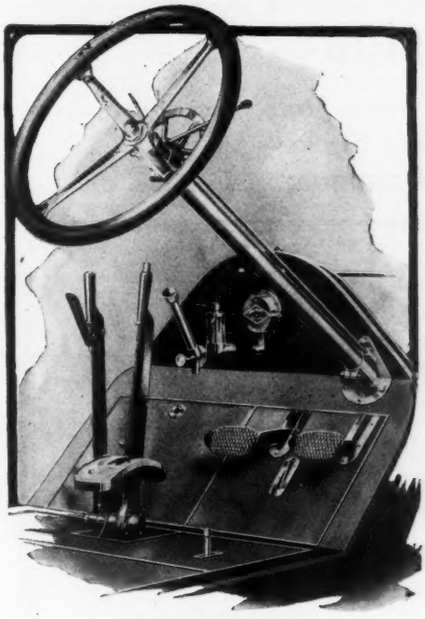
THE SPEEDWELL



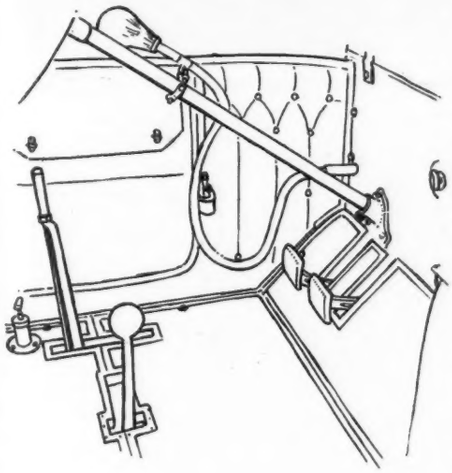
KING AND KNOX CENTER CONTROL

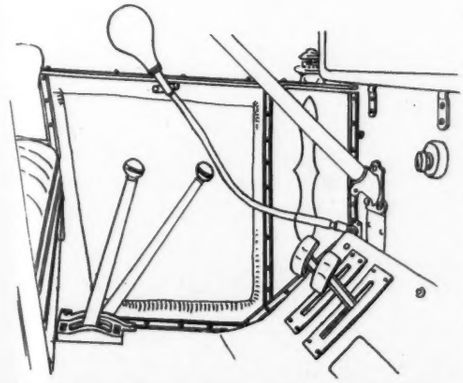
of the motor is practically the same as that used in the earlier model, but a sight feed on the dash has been added, and the screen for the oil pump in the motor base has been enlarged on the product put out for 1912.

EXAMPLES OF CENTER CONTROL



THE MITCHELL





KRIT ROADSTER AND KRIT TOURING CAR

Among the other details which show refinements in construction are cast bushings of the valve stems to aid in replacements and lagging of the exhaust pipes with asbestos. The surface of the dry-disk clutch has been increased and pressed steel front and back plates are employed instead of malleable iron. Demounting of the clutch is made easier by a new retaining rim. The clutch pedal levers are compounded to reduce pressure required in operating the clutch.

Brake rods are placed inside of the frame instead of outside, giving cleaner lines. Brake drums are 2 inches larger. The standard chassis with 118-inch wheelbase and 36 by 4-inch tires carries three bodies, a five-passenger, fore-door touring, four-passenger torpedo and a roadster. While the model G chassis with 115-inch wheelbase and 34 by 4-inch tires has a touring body, a racy type of roadster, and a doctor's special, the last is really a convertible roadster coupe, by which a coupe top is fitted on the complete roadster body. The Vesta electric lighting system is supplied on all touring cars.

Plans have been made to put out the Velie Junior but so far no official announcement has been made as to the details of construction.

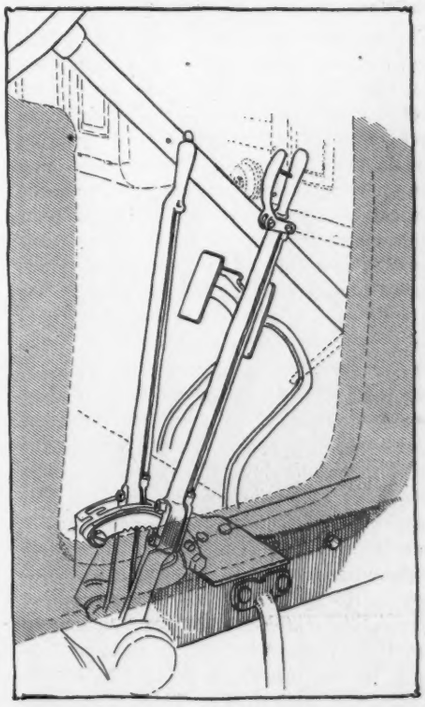
Warren-Detroit

Two new chassis models have been added to the Warren-Detroit line for the season of 1912; these are known as model 35, which may be fitted with a touring or roadster body, and the model 40, touring. The model 30 of 1911, however, remains unchanged except that it is designated 12-30 and, like the later models, is equipped with an acetylene self-starting mechanism. As for the new model 35, it might be called a development of the 30, for it is the same except that the motor has a ⅛-inch larger bore, inclosed valves, a new design of mushroom revolving push-rods; a single-unit vibrating coil, combined high-tension timer and distributer, and a DU4 Bosch magneto in the double ignition system .

An enameled instead of a polished brass radiator is employed; a gearset of similar design but with its shafts mounted in Hyatt roller bearings is used. The wheelbase is 112 inches, which is 2 inches longer than that of the 30; chassis springs are increased from 45 to 50 inches in length to improve the riding qualities; and the body designs are of a refined straight-line type. Though there are many points of similarity between the above models and the new model 40, it is heavier and larger throughout, and differs in that the valves of the motor are on the left instead of the right side, while the pump and carbureter are on the right. The gearset has both shafts in the same vertical plane instead of being arranged horizontally opposite each other, and they are mounted on annular ball bearings mounted in cages. Instead of having the propellor shaft inclosed in a torsion tube, that of the 40 is exposed, has two thoroughly incased universal points, and the torsional strains are absorbed by a torsion member. The rear axle is a floating design having a continuous pressed steel housing; and its differential and driving gears are all mounted in unit on a removable carrier.

Westcott

Whereas the Westcott only had one chassis last year, that one carrying a 4¾ by 5-inch motor, this year there is a new engine with 4½ by 5-inch bore and stroke. The former motor is fitted to the model R, the seven-passenger 45-horsepower car, while the new one is found in model K, L and M. In both motors the cylinders are cast separately, but the newcomer is featured by the use of an aluminum crankcase which is divided horizontally and which has five extra large bearings on the crankshaft, large valves all on one side and interchangeable parts. The cooling is effected by means of a gear-pump and a belt-driven fan; the lubrication is pump and sump, the pump being driven by a spiral gear from the crankshaft which forces the oil to the upper part of the crankcase, while the quantity of oil is indicated by a gauge on the right side of the crankcase. The ignition is optional, either Bosch or Remy dual, while the clutch is an aluminum cone in the flywheel. The front axle on all models is an I-beam with Timken roller bearings, and the rear one of the full floating type. The wheelbase is 120 inches and the tires 36 by 4, and carried on demountable rims. There are semi-elliptic springs both front and rear. The Disco self-starter is fitted to all models.



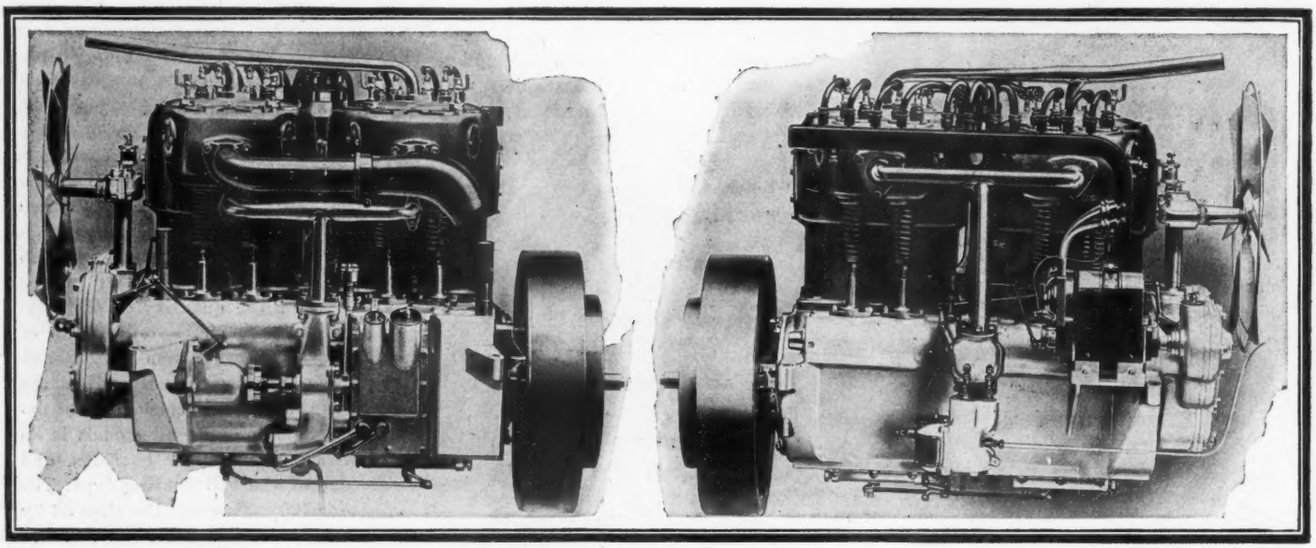
PIERCE-ARROW LOCATES CONTROL INSIDE BODY BY ENLARGING BODY AND SUPPORTING CAR ON PLATE

Forty New Motors the American Crop

Getting Ready for the 1912 Market Stirs Up Greater Activity Among Engineers Than in Any Season Since Year That Marked General Adoption of the Four-Cylinder—The Monobloc Type Coming into Popularity—Statistics of This Branch

Long Stroke Study of Designers

Of 302 Different Sizes There Are 260 With Stroke Greater Than Bore, Twenty-Six Square and Only Sixteen With Bore Greater Than Stroke—Apparently There Has Been General Reduction in Horsepower



PEERLESS 40-4 MOTOR WITH T-HEAD CYLINDERS CAST IN PAIRS, SHOWING VERTICAL SHAFT WHICH DRIVES FAN

THE 1912 motor shows much refinement when compared with that of 1911. The engineers have had a busy year bringing out new types of motors, and improving the old ones. There has been more activity than has been displayed since the year when the four-cylinder was making its debut. The activity has not been along any particular line, but along all lines. To explain: There has been a big crop of new motor sizes, there being in all forty new 1912 motors. The trend of the times is well exhibited in these because in not a solitary one of them is the bore equal to the stroke. Every one has the stroke the longer. It would hardly be right to call them long-stroke motors; some of them are and some are not, but the truth remains that in every solitary one is the stroke considerably more than the bore. The leader in the long-stroke line this year, out of 302 different motor sizes, is the new four-cylinder Only car with a bore 4.25 and a stroke 7.875 inches, or a stroke-bore ratio of 1.85 to 1. The remodeled Hupmobile motor takes second honors in the long-stroke field with a ratio of 1.69 to 1, its measurements being 3.25 by 5.5 inches, bore and stroke. Third place goes to a new Austin model, 4.5 by 7, giving a ratio of 1.56 to 1. Fourth place also goes to a new model, the new R. C. H., 3.25 by 5, or a stroke bore ratio of 1.54 to 1. These four leaders are all new models and after them comes the Moline four-cylinder, 4 by 6 inches, a ratio of 1.5 to 1, which was the leader in the long-stroke field last year. From this it is seen that the stroke-bore ratio during the year has jumped from 1.5 to 1 up to 1.85 to 1. This is a big leap and exemplifies very clearly the fact that the American maker has taken to the lengthening of the stroke and the reduction of the bore, with the hope of gaining in horsepower and also in efficiency by employing this method of motor manufacture.

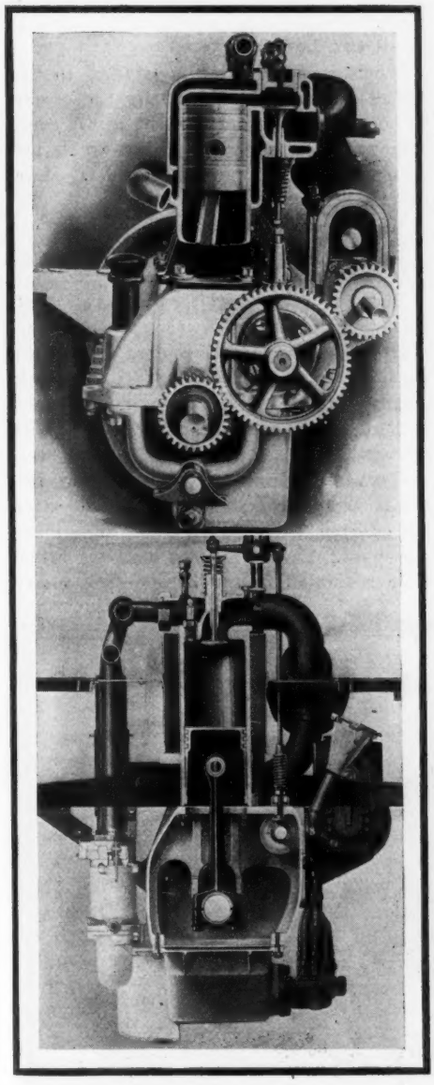
Trend in Motors

It is a conspicuous fact that of the first eighty-six motors classified downwards in the stroke-bore ratio category that all with but two exceptions are under 5 inches in bore. The two exceptions are the six-cylinder Pierce-Arrow and the six-cylinder Peerless with cylinders 5 by 7 inches. All of the others are under the 5-inch mark; in fact, the majority of them are under the 4.5-inch mark. It is a further fact that the leaders in the long-stroke field are under 4 inches in diameter, there being no fewer than thirteen different motor sizes with the bore under 4 inches. This reduction of the bore is a strong reminder of the tendency in motor construction which has been going on in Europe for the last two season, namely, that of making cylinders with a diameter of 90 millimeters, which is slightly under the 4-inch mark.

To the student of the long-stroke motor the tabulations of the different sized motors on the market for this year with their bore, stroke and bore-stroke ratio, will furnish a specially interesting study. In this group of 302 different motor sizes there are 260 different sizes with the stroke longer than the bore; there are just twenty-six using the square motor, that is, with the bore equaling the stroke, and there are but sixteen in which the bore is greater than the stroke. Among the makers of the square type motor are such concerns as Locomobile, Simplex, Maxwell, Kisselkar, Franklin, Stevens-Duryea, Jackson, Buick, Rambler, Speedwell, Paterson, Auburn and Carter-car. The class of makers employing a motor with a stroke less than the bore is gradually diminishing, and some of the names of the companies that have models which fall under this classification are: Stevens-Duryea, Corbin, Knox, Apperson, Maxwell, Elmore, Schacht, Regal and Ohio.

It is very easy, however, to note that not a few of the manufacturers who have pinned their entire faith to square motors during seasons past have brought out new models with the stroke considerably in excess of the bore, but still continue to carry their square sizes. A conspicuous example of this is the new small six of the Locomobile, namely, 4.25 by 5, as compared with the other two Locomobile types, which are 4.5 inches square. It is true the new model is not a long-stroke type, its stroke-bore ratio being 1.17 to 1, which is sufficient to show the trend of the times.

The Pierce-Arrow model six-66 fills a rather interesting position in the long-stroke field in that it is practically the only motor continued from last year and in which the bore has been cut down and the stroke lengthened. Last year this motor was 5.25 by 5.5 inches; this year it is 5 by 7 inches; it is seen that the stroke has been lengthened 1.5 inch and the bore cut down .25 inch. This is a very characteristic change, appearing as it does in one of the biggest touring car models on the American market.



TWO METHODS OF COOLING. THE MITCHELL LONG-STROKE MOTOR WITH WATER-JACKETS EXTENDED OVER THE CYLINDER HEADS IS SHOWN ABOVE

A SECTION OF THE FRANKLIN AIR-COOLED MOTOR IS SHOWN BELOW WITH THE RADIATING FANS IMBEDDED IN THE CYLINDER WALL

Horsepower Decreasing

It has been generally advanced as an argument that with the lengthening of the stroke of the motor and a tendency to cut down the bore there would be a perceptible reduction in the horsepower in proportion as this change took place. This is not as conspicuous as might be expected. It is a fact that in large cars there has been a gradual reduction in horsepower during the last 3 years. Motor Age has by actual calculation obtained the average horsepower of the different motors on the market during the last 3 years. In order to make these facts more intelligent the entire car field has been divided into four divisions, as follows: The $4,000 car, the $2,500 car, the $1,500 car and the $1,000 car. The $4,000 car is an average of all the cars listed at $3,000 or over; the $2,500 car is an average of all listing from $1,800 to $2,999; the $1,500 car is the average of those listing from $1,250 to $1,799, and the $1,000 is the average of those listing under $1,250.

Looking at the $4,000 car there has been a reduction in horsepower during the last 3 years as follows:

1910 average horsepower.....46.65
1911 average horsepower.....43.66
1912 average horsepower.....43.40

This shows that there was a very perceptible reduction between 1910 and 1911, but a much slighter reduction between 1911 and 1912. The reduction for this year over last is practically ¼-horsepower. This is slight, yet it is a certainty that there will be a greater reduction in the 1913 $4,000 car. One reason why the reduction is so slight this year is that not a few makers in this class already started to develop smaller sizes, and the larger sizes have been left unchanged and are often sold in reduced quantities. There is still another reason why there appears to be so slight a reduction in the horsepower of this car, which is the introduction of six-cylinder motors by several of the companies in this category, some of these being Packard, White, Garford, Peerless, Fiat, Stoddard-Dayton, Chalmers and the new Locomobile.

Some Deductions

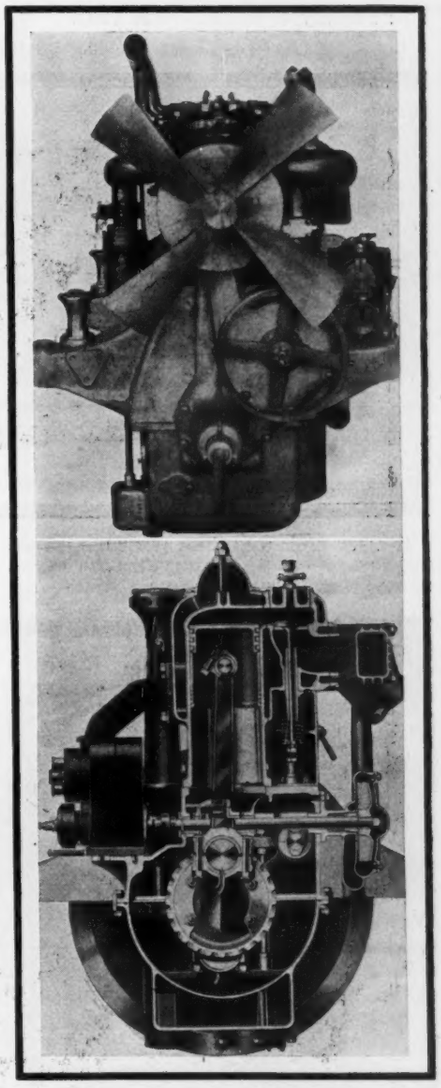
When we look at the $2,500 class we see a slight increase in horsepower during the last 3 years. It is shown in the following tabulation:

1910 average horsepower.....30.65
1911 average horsepower.....35.60
1912 average horsepower.....35.45

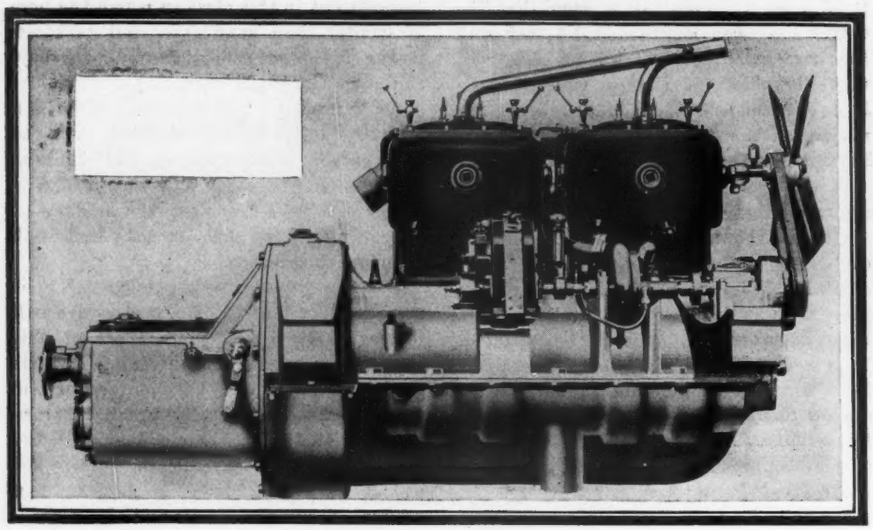
This shows a decided jump of 16 per cent between 1910 and 1911, but a slight drop this year as compared with last. A literal interpretation of this would indicate that this slight reduction in power has been due to the many new models brought out in this class in which the bore is smaller than heretofore, and as horsepower is based solely on cylinder bore this shows a slight reduction.

As a matter of fact there has been a slight reduction in the bore, last year the average bore was 4.43 inches and this year is 4.40. On the other hand the stroke is longer this year than last, the average of a year ago being 4.96 as compared with 5 inches this season.

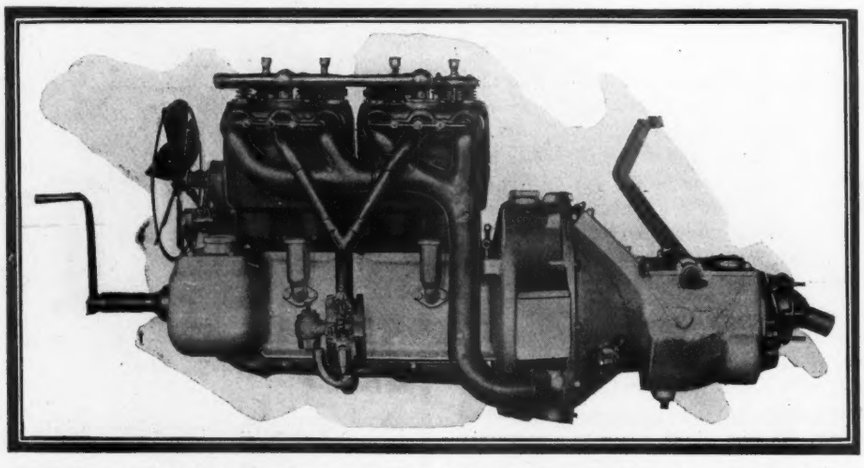
When we come to the $1,500 car it is quite evident that the motor sizes are still increasing and that the makers of this type of car are doing everything in their power to give more horsepower for the money and so apparently break into the business of the $2,500 class. There has been a gradual increase in horsepower and a gradual increase in bore and a gradual increase in stroke and also a gradual increase in the stroke-bore ratio of



TWO DESIGNS OF MOTORS. IN THE ABOVE ILLUSTRATION IS SHOWN THE COLUMBIA-KNIGHT SLIDING SLEEVE VALVE MOTOR. BELOW IS SHOWN A SECTION THROUGH CYLINDER OF MARION LONG-STROKE MOTOR, SHOWING WATER DOME OVER CYLINDER HEADS AND OTHER CONSTRUCTIONAL FEATURES



RIGHT SIDE OF UNIT POWER PLANT OF ABBOTT 44 WITH A CONTINENTAL L-HEAD MOTOR. THIS MODEL IS A NEW ONE AND SHOWS METHOD OF MOUNTING WITH THE ABBOTT COMPANY THIS YEAR



INTAKE SIDE OF BUICK FOUR-CYLINDER MOTOR WITH CYLINDER CAST IN PAIRS. THIS IS AN EXAMPLE OF THE UNIT CONSTRUCTION OF POWER PLANT AND SHOWS LEFT SIDE OF THE MOTOR

these motors during the last 3 years. The following figures explain it:

1910 average horsepower.....27.20
1911 average horsepower.....29.53
1912 average horsepower.....30.61

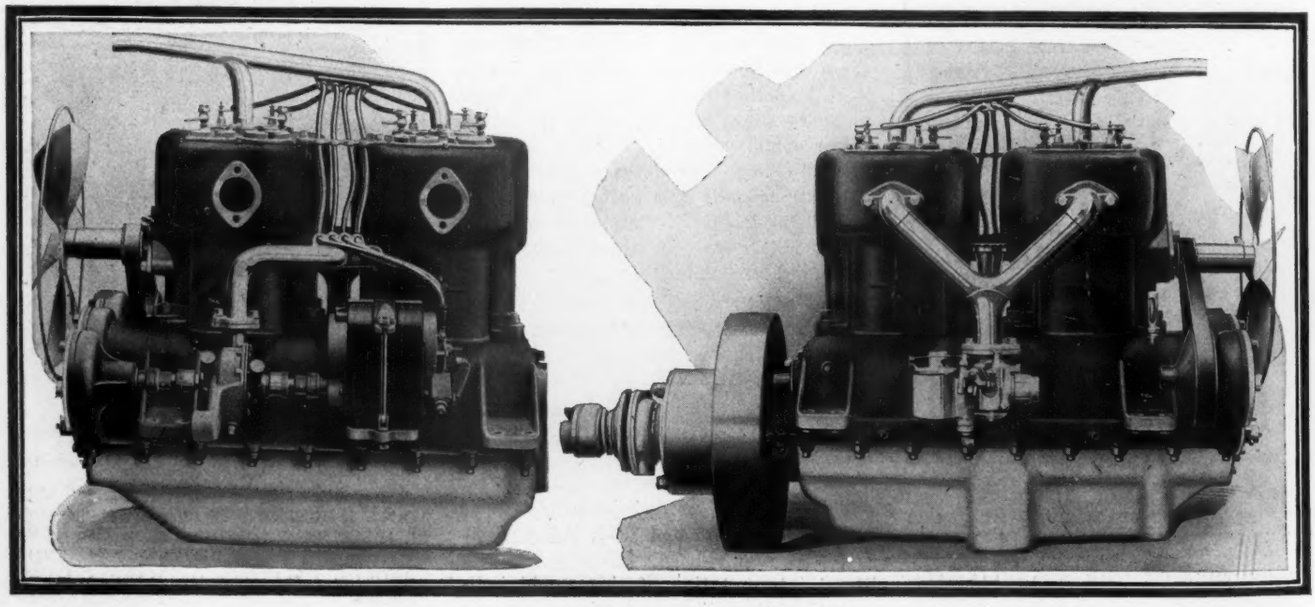
In the 3 years the increase in cylinder bore has been along the following steps: 4.14 inches, 4.19 inches, 4.26 inches. In the same period the stroke has grown in the following form: 4.41 inches, 4.64 inches and 4.86 inches. The increase in stroke-bore ratio has been 1.06, 1.10 and 1.14. It is a strange fact that, although there has been an increase in horsepower and also in the bore and stroke, there has been a slight reduction in the average piston displacement for this year. The figures for the 3 years are: 1910, 238 cubic inches; 1911, 262 cubic inches, and 1912, 226.5 cubic inches. In this class it would seem that for 1913 we may look for a slight reduction in horsepower and a most perceptible gain in the stroke-bore ratio.

Small Car Lower Powered

When your attention is directed to the $1,000 car there is seen a slight decrease in horsepower as compared with last year, although last year showed a considerable increase over the previous season. Here are the figures:

1910 average horsepower.....19.85
1911 average horsepower.....21.23
1912 average horsepower.....21.18

These figures would tend to show that there is no effort on the part of the makers in this classification to break into the field of the $1,500 class by any such means as increasing horsepower. It would rather seem that this class of makers is content to rather reduce price and beat the other class out by giving more for the money than trying to pull away sales by offering extra horsepower as an inducement. There has been a very perceptible reduction in the bore in this class,



THE FOUR CYLINDERS OF THE CASE MOTORS ARE CAST IN PAIRS WITH THE VALVES ON ONE SIDE. THE ILLUSTRATIONS SHOW RIGHT AND LEFT SIDES OF THE MOTOR

dropping as it has from 4.01 inch last year to 3.78 inches for this season. These are the average figures for all cars in this classification. There has been a proportionate lengthening of the stroke. Last year it was 4.21 inches and this year it is 4.37. The piston displacement has increased slightly, due to the larger number of four-cylinder cars and the reduced number of two-cylinder types.

General Observations

Some general observations can be made on the trend of motor construction through the ascending scale of prices. To explain: the sleeve-valve motor is not seen until the $4,000 class is reached, meaning that none of these are at present listed under the $3,000 mark. The T-type casting increases in popularity as the price rises, as follows:

$1,000	car.....	T-head	percentage 7
1,500	car.....	T-head	percentage 15
2,500	car.....	T-head	percentage 43
4,000	car.....	T-head	percentage 52

This present trend is the same as in previous years, excepting that in the $1,000 car the percentage has been dropping steadily since 1909; in 1910 it was 13 per cent, in 1911 it was 11 per cent, and this year it is 7. The diminishing of the T-head type has gone hand in hand with an increase in the L type for cars of this classification. The L type is cheaper, which is the big consideration.

An important change of the year is the increase in monoblocs. These are now found in all four average cars, having a 31 per cent following in the $1,000 car, 30 per cent in the $1,500, 11 per cent in the $2,500 and 5 per cent in the $4,000.

Thermo-syphon cooling has a big following in the $1,000 class, namely 48 per cent; it has 31 per cent in the $1,500; but 1 per cent in the $2,500; and 3 per cent in the $4,000 class. These figures show that there has not been the anticipated increase.

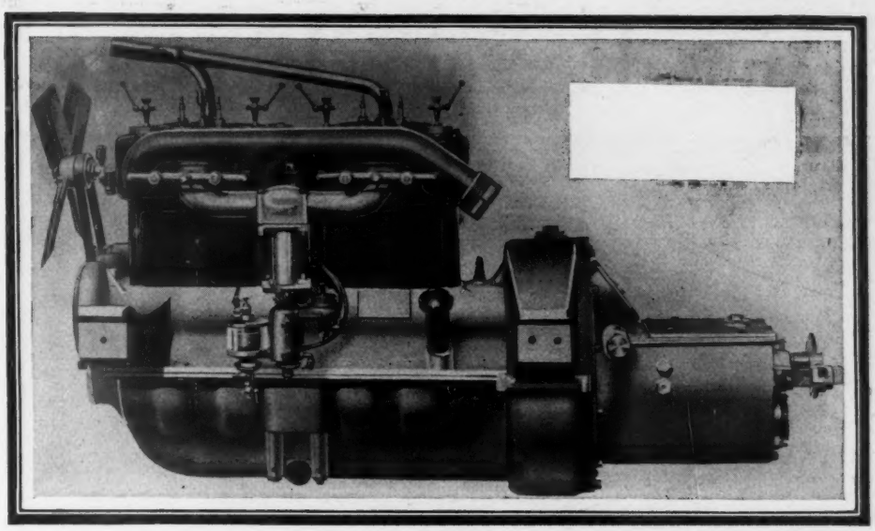
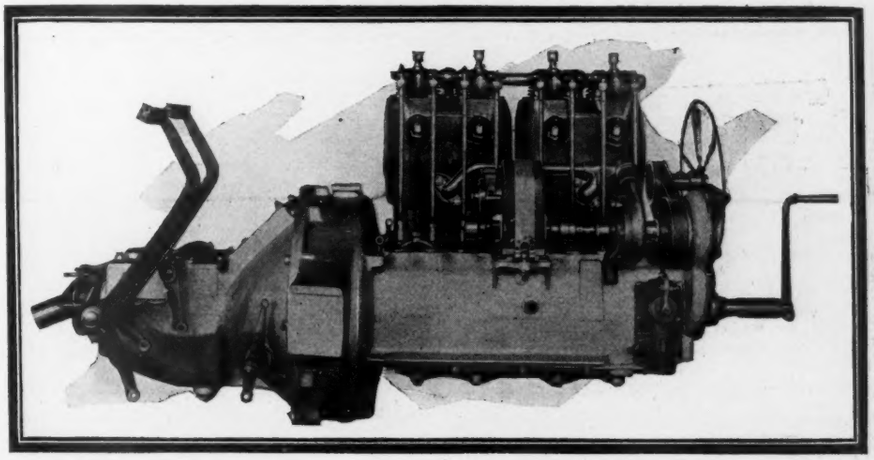
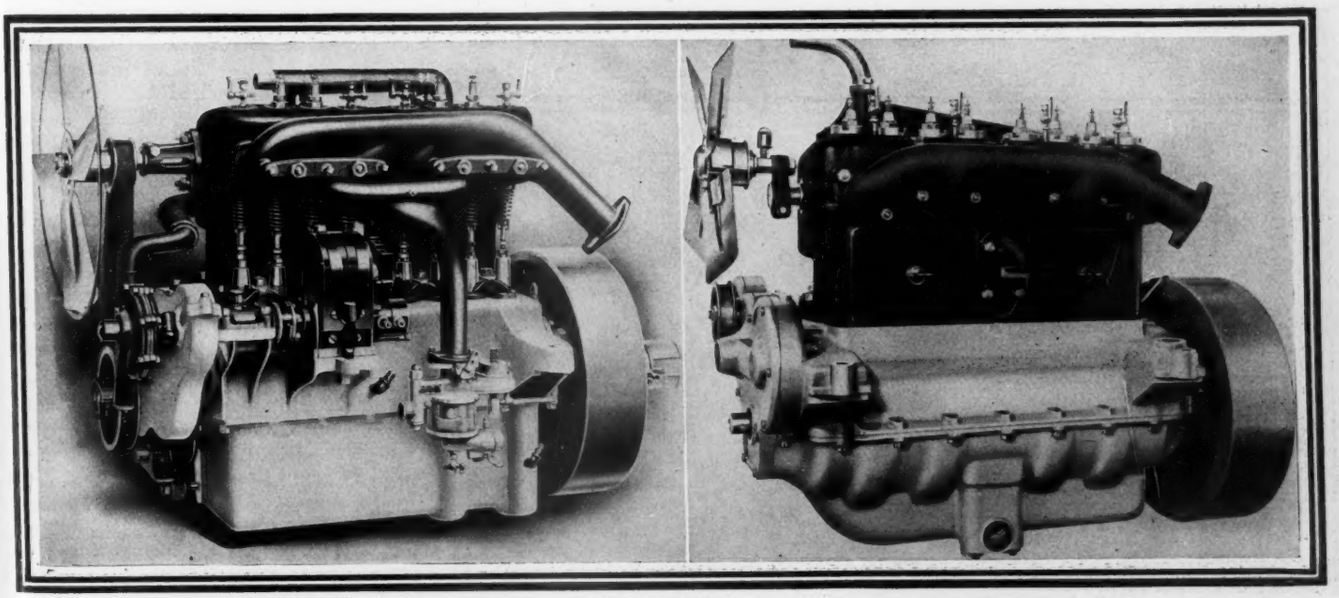


ILLUSTRATION OF LEFT HAND SIDE OF MOTOR SHOWING THE VALVE INCLOSURE ON THE UNIT PLANT OF THE ABBOTT-DETROIT 44, A NEW MODEL, AND PROVISION FOR QUICK REMOVAL OF MANIFOLD



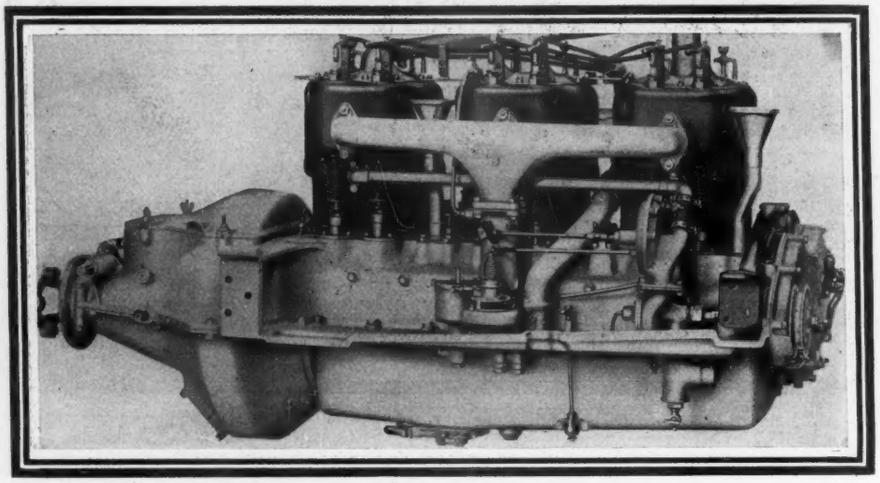
RIGHT HAND SIDE OF BUICK MOTOR WITH OVERHEAD VALVES AND CYLINDERS CAST IN PAIRS, SHOWING SOME OF THE CONSTRUCTIONAL FEATURES OF THE ENGINE—ANOTHER UNIT POWER PLANT



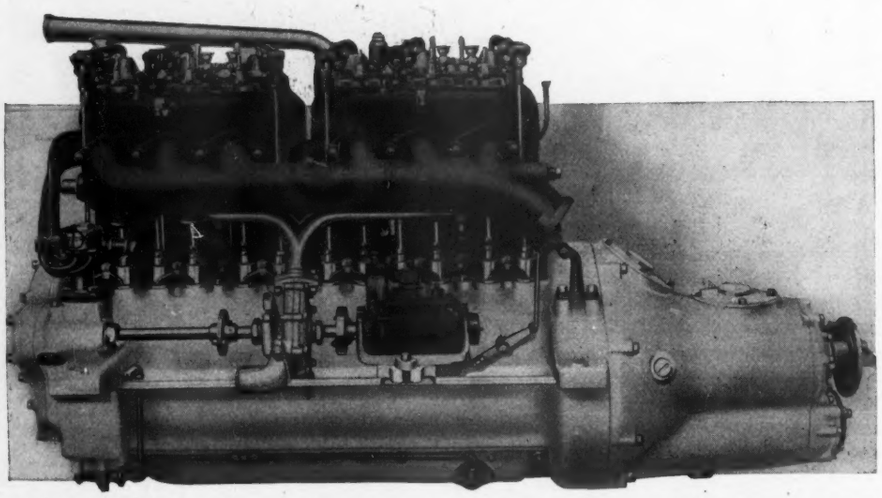
NEW MOTOR OF THE MITCHELL HAS ALL VALVES ON LEFT-HAND SIDE INSTEAD OF IN THE TOP

THE NEW CONTINENTAL MODEL C MOTOR WITH ITS FOUR CYLINDERS CAST EN BLOC

Many Recruits Join Six-Cylinder Army



INTAKE SIDE OF THE PACKARD UNIT POWER PLANT, WHOSE MOTOR HAS A T-HEAD WITH THE CYLINDERS CAST IN PAIRS



UNIT POWER PLANT OF CHALMERS SIX, AN OVERHEAD VALVE MOTOR WITH CYLINDERS IN BLOCKS OF THREE

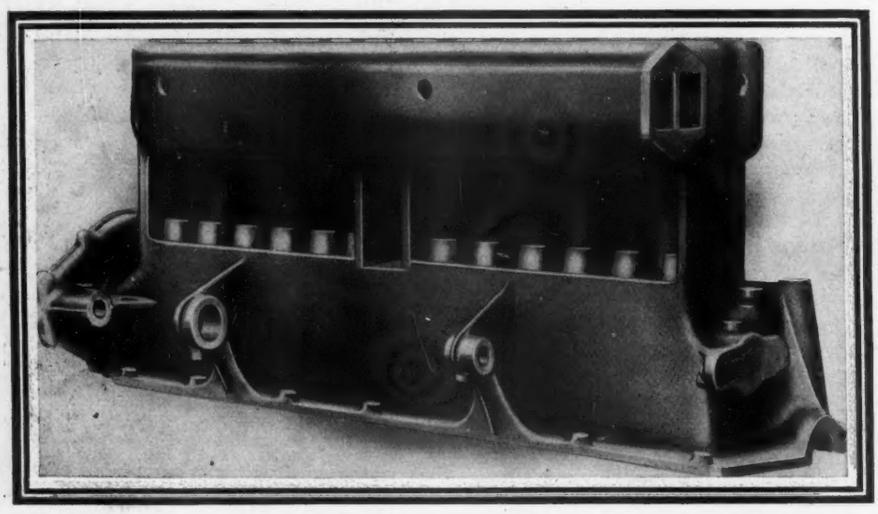


ILLUSTRATION SHOWING THE SINGLE CASTING THAT FORMS THE CYLINDERS AND MANIFOLDS OF THE EVERITT SIX

Constructional Points of the Six-Cylinder Show Careful Study On Part of the Designers

ONE of the most pronounced motor features of the year has been the increase in the number of six-cylinder cars; many concerns which hitherto have held out against the six-cylinder invasion have brought out their initial models and half a dozen of the concerns which previously have built six-cylinder models have added additional models. Among the new six-cylinder names are Packard, White, Everitt, Chalmers, Garford, Stoddard-Dayton, Fiat, and there are several other promised makes to be shown for the first time in New York. Peerless, which hitherto has built but one model, has three listed for this season; Locomobile has added a small six, at the same time retaining its larger model; Mitchell has added two more models; Pierce continues its three models with which the trade is familiar; Franklin has three models; and Oldsmobile and Stevens-Duryea two each; Winton is building nothing but sixes; the Thomas company has but one model and that is a six. Some of the concerns building but one model are Pope-Hartford, Lozier, Premier, Matheson, Knox and Alco.

Casting Tendency

A very noticeable feature in the six-cylinder field is the simplification of the cylinder castings. We have been getting accustomed to block castings in the four-cylinder field, but not before this year have we had these in the six-cylinder class. For this year the White and Everitt have the six-cylinders in one casting, both of the designs giving an extreme clean-cut appearance. The White, recently placed on the market, is along the same design as the four-cylinder block casting with intake and exhaust manifolds as well as the inlet and outlet water pipes integral with the motor parts. On the Everitt a similar compactness of construction is obtained. A third motor which must be included in this class is the Fiat. It uses a one-piece L-type casting and employs a construction not frequent in America, namely, using a transverse shaft at the forward end and carrying the magneto on one end and the water pump on the other.

Another marked tendency in six-cylinder construction is the casting of the cylinders in two blocks or groups of three each. This construction is employed in the new Stoddard-Dayton-Knight, in the new Chalmers, in the new Palmer-Singer and also in the new Garford. The Thomas was a pioneer in America to make use of cylinders cast in threes, but this method was discontinued and the casting of pairs adopted.

Simplification of Castings a Feature

Packard, White, Everitt, Chalmers, Garford, Stoddard-Dayton and Fiat Are on the List

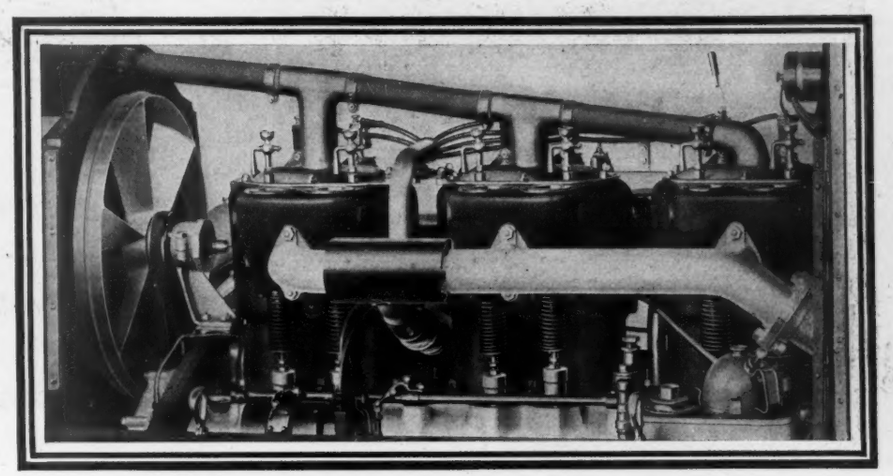
Not a few of the six-cylinder makers have carried improvements into their new models.. For example, the new Packard six, while employing the same general style of twin casting with opposite valves, has introduced a new type of crankcase which is continued rearward, entirely inclosing the flywheel, together with the dry-disk clutch. The motor is carried on three-point suspension, whereas four-point support has always been used previous to this season. One point of support is the trunnion at the forward end and the other two are direct on the side frame members.

The new Garford six carries many of the earmarks of present tendencies. The cylinder castings are L type with rectangular plates to cover the valve springs and tappets. The carbureter is housed in a compartment or box-like chamber in the crankcase, on the non-valve side, the intake manifold being carried across to the valve side between the two groups of castings. This motor is fitted with a double spark magneto outfit delivering two sparks simultaneously in each cylinder. Contrary to general custom in L type cylinders, one spark plug is placed in the cap over the intake valve and the other mounted on an angle on the opposite side of the combustion chamber. It is when spark plugs are placed at opposite sides of the combustion chamber that added efficiency is obtained from a two-spark system. This motor also suggests a trend in construction, namely, the reduction of crankcase capacity, so that the necessary quantity of oil required in the case is greatly reduced. The lower part of the case has a corrugated appearance, each of the corrugations forming a trough into which a connecting rod dips.

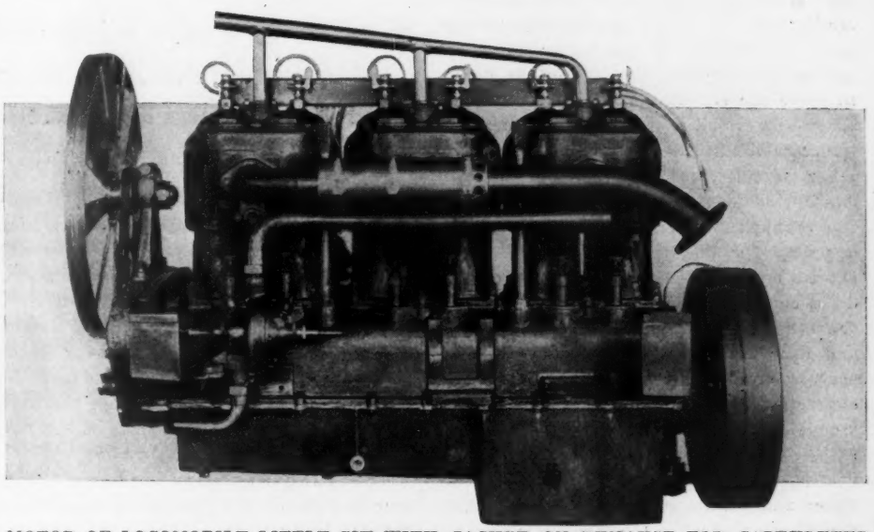
New Fiat Six-Cylinder

The new Fiat six is one of the compact block castings of the year. It is a particularly neat job. The casting is an L type and one large plate, secured through two finger wheels, covers the entire set of six intake and six exhaust valve stems. The water pipe and the intake manifold are short, giving the motor a clean-cut appearance. This is further accentuated by the disposition of the magneto and waterpump on the transverse shaft.

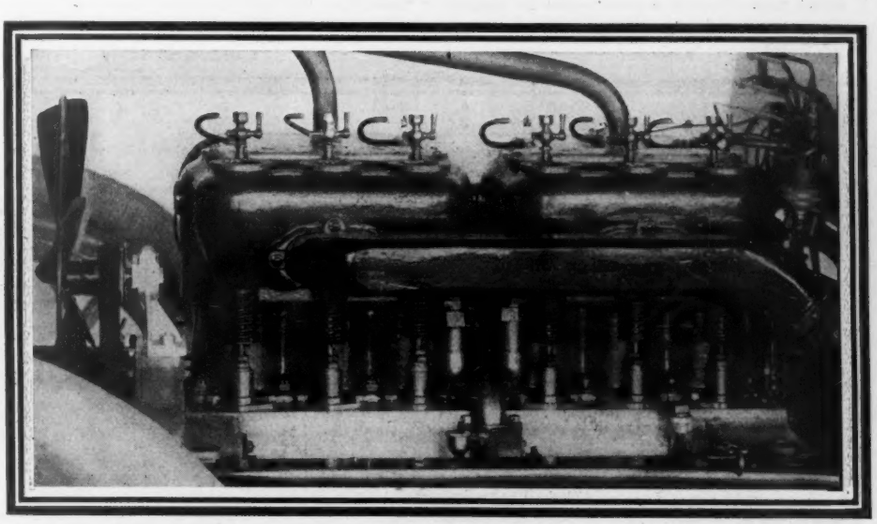
The return of the Stoddard-Dayton to the six-cylinder design but exemplifies the noid that the six motor in the high-priced field is gaining. This motor is a typical Knight design with the two reciprocating sleeves between the cylinder and piston. The details of this valve system are described in a non-poppet valve article in Motor Age last week. This is a long-stroke



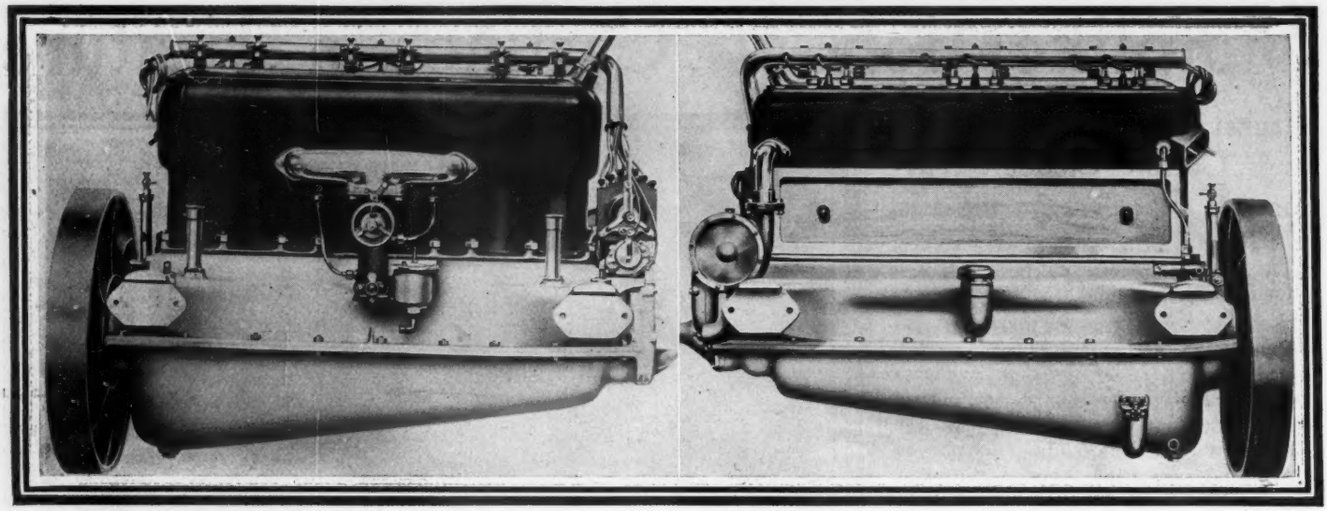
SIX-CYLINDER MOTOR OF THE PACKARD WITH ITS TWIN-CASTING AND JACKET AROUND EXHAUST FOR SUPPLYING HOT AIR TO THE CARBURETER



MOTOR OF LOCOMOBILE LITTLE SIX WITH JACKET ON EXHAUST FOR CARBURETER HEATING AND IGNITION CONDUIT



PALMER & SINGER BRIGHTON SIX MOTOR HAS ITS CYLINDERS CAST IN BLOCKS OF THREE, AS ILLUSTRATED



SIX-CYLINDER MONOBLOC MOTOR OF FIAT HAS INCLOSED VALVES AND CLEAN APPEARANCE. THIS SIX IS NEW THIS YEAR AT THE AMERICAN FIAT PLANT

motor 4.5 by 5.5 inches, or a stroke-bore ratio of 1.22 to 1. It is practically the only Knight type of motor using an offset crankshaft, this offset approaching 25 per cent. A feature of the motor construction is the employment of a silent chain to drive the eccentric shaft, the eccentric shaft corresponding to the employment of the camshaft in a poppet-valve motor. Another feature is the employment of an equilibrium device on the forward end of the crankshaft. This device constitutes a pulley for driving the fan and is in short a multiple-disk clutch, one set of the disks connecting with the crankshaft and the other set with the pulley. The give and take between the two sets of disks serves as an equalizer of torque. Another characteristic is the employment of the trough lubricating system, in the crankcase. The scoop on the end of each connecting rod dipping into the trough of oil. These troughs are interconnected with the throttle so that when the throttle is opened to give more speed the oil trough is raised to give more oil.

The new Chalmers six motor is largely a duplicate in design of the new 4-36 Chalmers model, excepting it has the cylinders cast in groups of three. This has been done in order to eliminate the necessity of extra factory operations in its manufacture. It is a unit power plant, with the flywheel entirely encased. The intake valves are placed in the cylinder heads as in the other Chalmers models and the exhaust in an offset. No attempt has been made to house the valve springs. A new self-starter has been fitted.

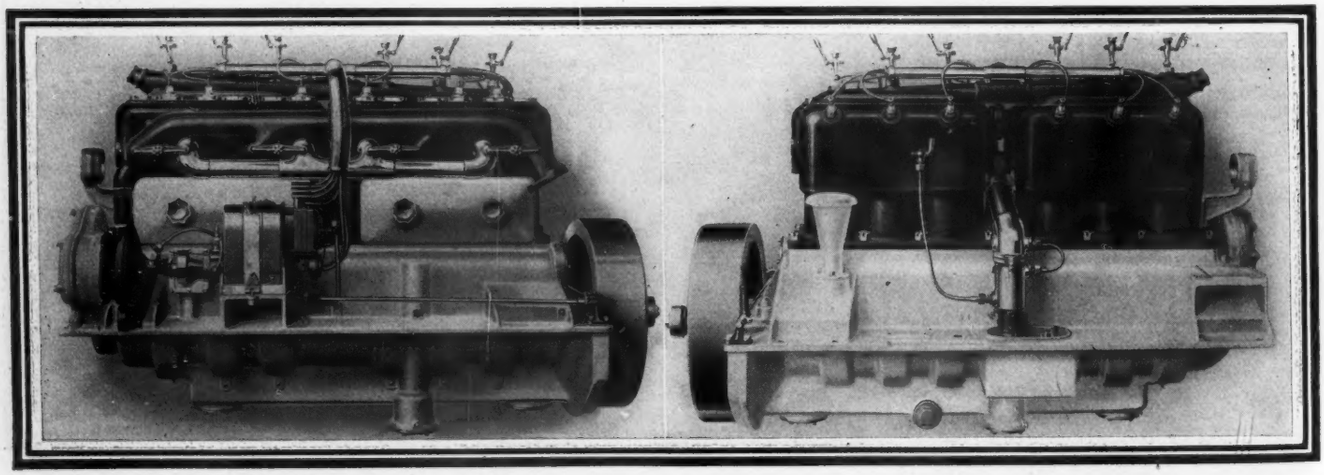
Designers Take Kindly to Monobloc

Sixty-Seven Four-Cylinder Models Now Employ This System of Casting, Addition to List Including Stoddard, Warren, Schacht, Regal, Herreshoff, Crow-Elkhart, Colby, American, Halladay, Garford and Firestone

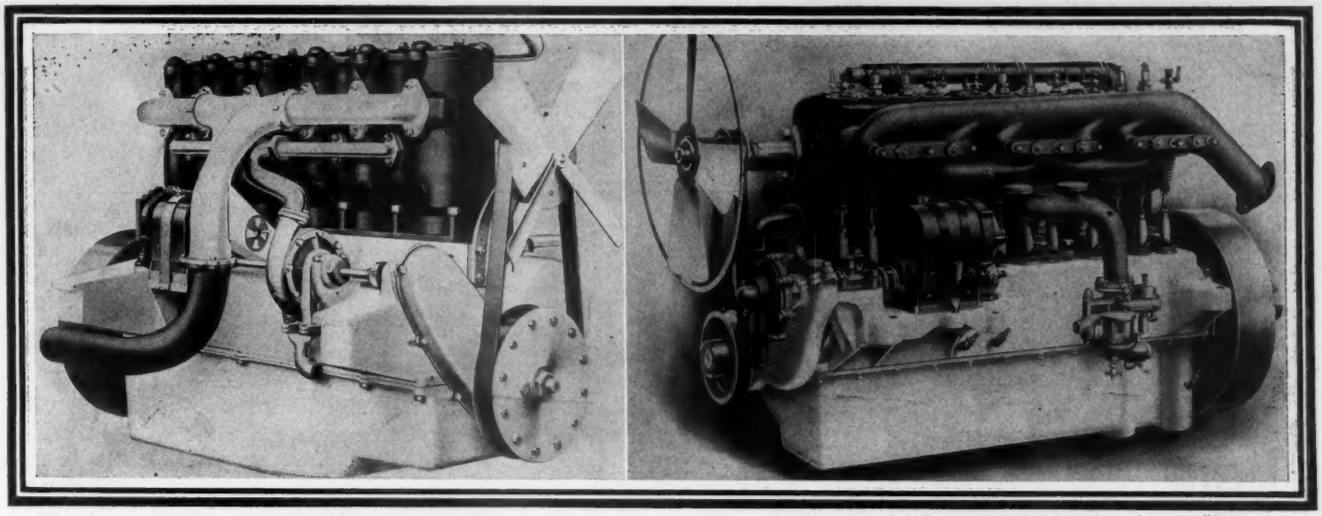
The Mitchell company has brought out a new design of six-cylinder motor which differs chiefly from its previous models in the use of an L-type cylinder casting. Heretofore the exhaust valve has been mounted in the cylinder head, with the intake in the offset chamber, but for this year both valves are mounted side by side in the base of the offset.

Palmer & Singer have added a new six-cylinder motor known as the Brighton. It has the cylinder cast in blocks of three with valves mounted on opposite sides. No attempt has been made to inclose the valve springs and tappets. This motor is a conventional construction resembling a four in size more than a six.

The Peerless has shown perhaps the greatest activity in the six-cylinder of any of the exponents of this type of construction. Last year it had but one six and now it has three. The model 6-38 is built along the same line of the previous one, with twin-cast cylinders having opposite valves.



NEW GARFORD SIX HAS CYLINDERS CAST IN THREES, INCLOSED VALVES AND MULTI-POINT IGNITION



THE STODDARD-DAYTON-KNIGHT SIX IS ONE OF THE FEW SLEEVE VALVE MOTORS

THE MITCHELL SIX APPEARS WITH VALVES ON THE SIDE FOR THE FIRST TIME

Trend of Construction Hard To Trace

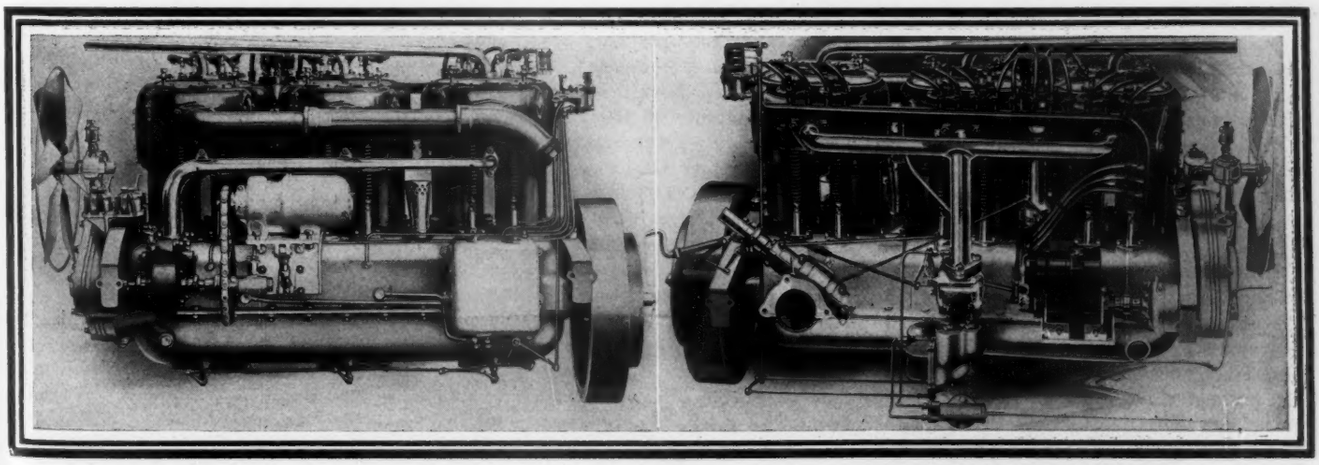
On Some Cylinder Castings Incorporate Intake and Exhaust Manifolds and Water Pipe and on Others Manifold Is Detachable—T and L Head Types Race For Supremacy with Honors Even

THERE has been much activity in the production of monobloc four-cylinder motors for the present season. There are sixty-seven models of this type of four-cylinder motors at present on the market. In this list are such names as White, Hudson, Ford, Flanders, Everitt, Chalmers and Bergdoll which have been exponents of this design for several seasons, but the new list contains many additional lists, such as Stoddard-Dayton, Warren, Schacht, Regal, Herreshoff, Crow-Elkhart, Colby, American, Halladay, Garford, Firestone, etc. The list is now a most representative one.

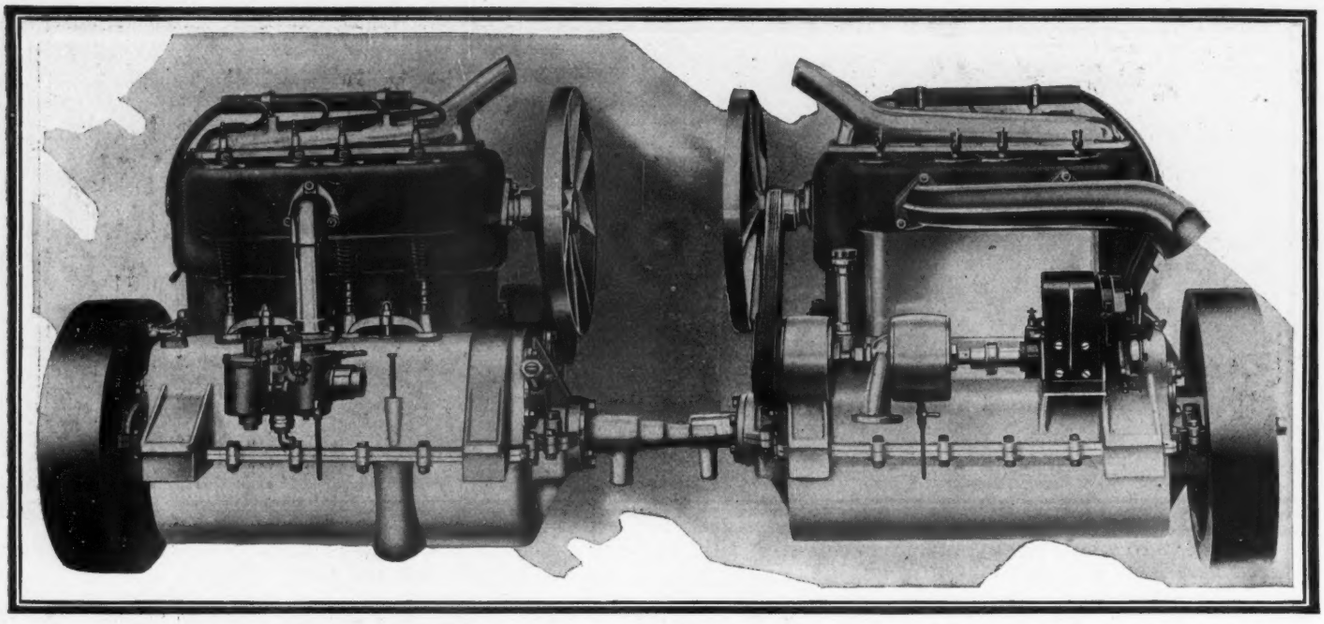
It is true that the majority of the monobloc motors are of medium size, there being but two examples of 5-inch or larger sizes: One is the Reading with 5-inch bore and the other is the Schacht 5⅛-inch bore. Looking all through the different types of monobloc it is impossible to trace any definite trend of construction. Some aim at having the cylinder castings incorporate the intake and exhaust manifolds and water pipe. The White is a good example of this. On many others the manifolds are detachable, examples of this being Chalmers, Hudson, American, Garford and R. C. H. The apparent reason for making the manifold detachable is that a different size of intake can be fitted for racing purposes, and if necessary short stub types used in the exhaust on racing cars.

The policy of adopting a T-head or L type of motor also is an unsettled one. It is generally conceded that the L type is a cheaper manufacturing proposition and has a much larger following than the T-head design. Where the L type is used and both intake and exhauste manifolds are detachable it necessitates more or less cluttering up of the side of the engine. It and both intake and exhaust manifolds must be carried quite high in order to leave the valve springs accessible. This is still more necessary because of the use of plates for inclosing the valve spring, stems and caps.

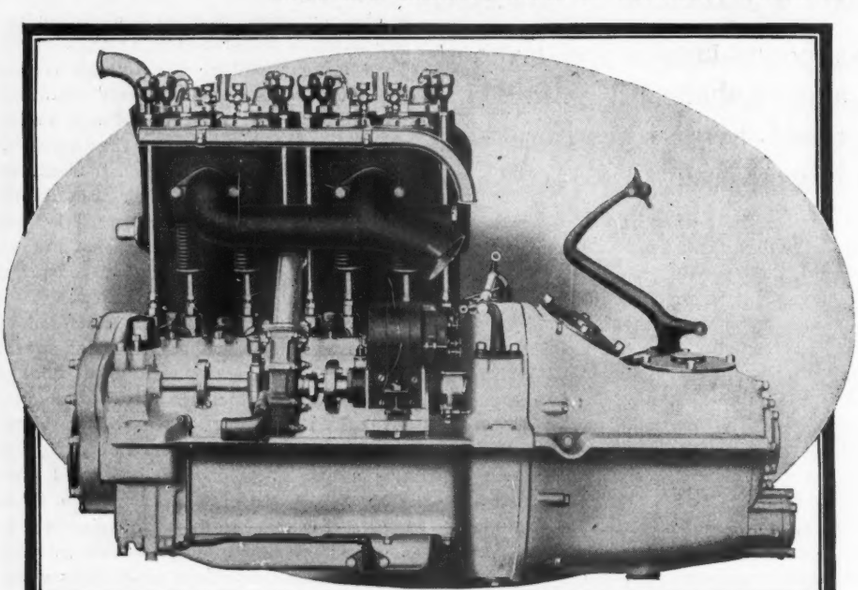
In order to eliminate this cluttered up appearance some makers are placing the carbureter on the opposite side from the valves and conducting the intake gases through the waterjackets between the second and third cylinders. A design of this nature is used on the Garford four, Fiat six, R. C. H. four, American Scout type and others. In addition to giving the motor a more balanced appearance this construction has the value of practically waterjacketing the intake manifold, a scheme by which condensation of the mixture on its way to the cylinders is prevented.



PEERLESS 38-SIX MOTOR SHOWING LOCATION OF LIGHTING GENERATOR AND PRIMING DEVICE



INLET AND EXHAUST SIDES OF MONOBLOC MOTOR OF AMERICAN TOURIST



EXHAUST SIDE OF CHALMERS 36 UNIT POWER PLANT MONOBLOC MOTOR WITH INTAKE VALVES IN THE HEADS OF THE CYLINDERS

Several of the new monobloc motor types are illustrated on these pages. The American company has brought out two different types, one known as the Tourist 32.4 horsepower, and the other the Scout 22.5 horsepower. The Scout motor is a unit with the gearbox and has the flywheel entirely inclosed. This unit and monobloc construction gives practically the nearest approach possible to simplification in a car and leaves the maximum space between the axles for body facilities. On the other American model the motor and gearbox are a separate unit. The motor is a T-head design with a cover fitted for the exhaust valve springs, but none illustrated for the intakes. Both the magneto and water pump are placed on the exhaust side with the carbureter on the opposite.

The new Chalmers 36 is a practical duplicate of the Chalmers 30 so far as general design is concerned. The intake manifold is a semi-unit with the cylinder casting, the inner of the manifold being water-jacketed. Intake and return water pipes on the new Chalmers 36 motor are of minimum length.

The Garford is a 1912 convert to the monobloc style. It uses an L type of casting and places the carbureter on the non-valve side and locates it in a box-like compartment in the crankcase web. A specially large oil filler is also placed on this side of the motor. Every thing has been done to provide accessibility on the valve side. The intake and exhaust manifold are carried high up and anchored by three yokes; the magneto is centrally placed; and the water pump is well in advance of the front cylinder. This arrangement permits of the use of valve cover plates and leaves the valve springs accessible.

A new monobloc design for this year is the R. C. H. It follows the L type construction with the carbureter placed on the non-valve side. This is a long-stroke motor, 3.25-inch bore and 5-inch stroke, and it stands high in the list of stroke-bore ratios, coming forth in this classification. One respect in which this motor differs from many other monobloc types is that two large inspection plates are provided on the left side, the forward one being to provide access for the two lower connecting rod bearings on the front cylinder, the rear plate serving in a similar capacity for the back cylinders. This motor uses a detachable exhaust manifold.

A monobloc motor which occupies a unique position in this division is the new Hupmobile, 3.25-inch bore and 5.5-inch stroke. This motor has the distinction of being second in the stroke-bore ratio; the ratio of stroke to bore being 1.69 to 1. The only car to lead it is the new Only with a ratio of 1.85 to 1. There are one or two charcteristic features in this new Hupmobile. Owing to the length of the stroke it has been necessary to provide angular spaces at the base of each cylinder at the right side in order to accommodate the connecting rods necessary for this length of stroke.

Another characteristic feature is that instead of there being an individual cap over each valve there is a common plate lying along the top of the valve chamber and doing duty for the eight valves. This plate carries four spark plugs and the four priming cups, and is held in place by eight threaded studs. As with many of the other monobloc castings additional cooling of the manifold, which is common for both intake and exhaust, has been obtained by cooling flanges.

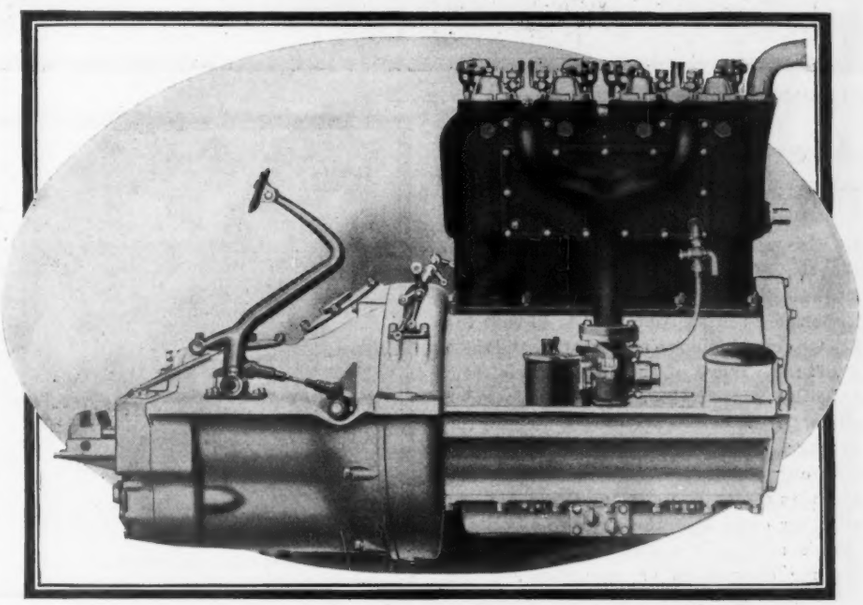
With the advance that has been made in the foundry art it is a certainty that 1913 is going to show an enormous increase in the use of monobloc castings. A good fast pace has been set for 1912 and more or less of a landslide is expected for next season. Many makers have held aloof from monobloc construction because of the extreme temperatures to which the American car is subjected. The successful operation of such types of motors for several seasons has practically eliminated this argument. Not only has the salesman discovered that the monobloc is a success in America but the owner has also buried the prejudice that he previously harbored against this method of engine construction.

In the earlier days of monobloc castings the big argument advanced was cost of replacement. It was argued that a four-cylinder casting was vastly more expensive than a twin casting. To go back a step further, when the method of castings in pairs was being introduced, the argument against it was that two castings cost so much more than the one; now there is not a concern which makes the replacement cost a factor in deciding whether cylinders shall be cast separately, in pairs, in threes or monobloc. All are striving for the best.

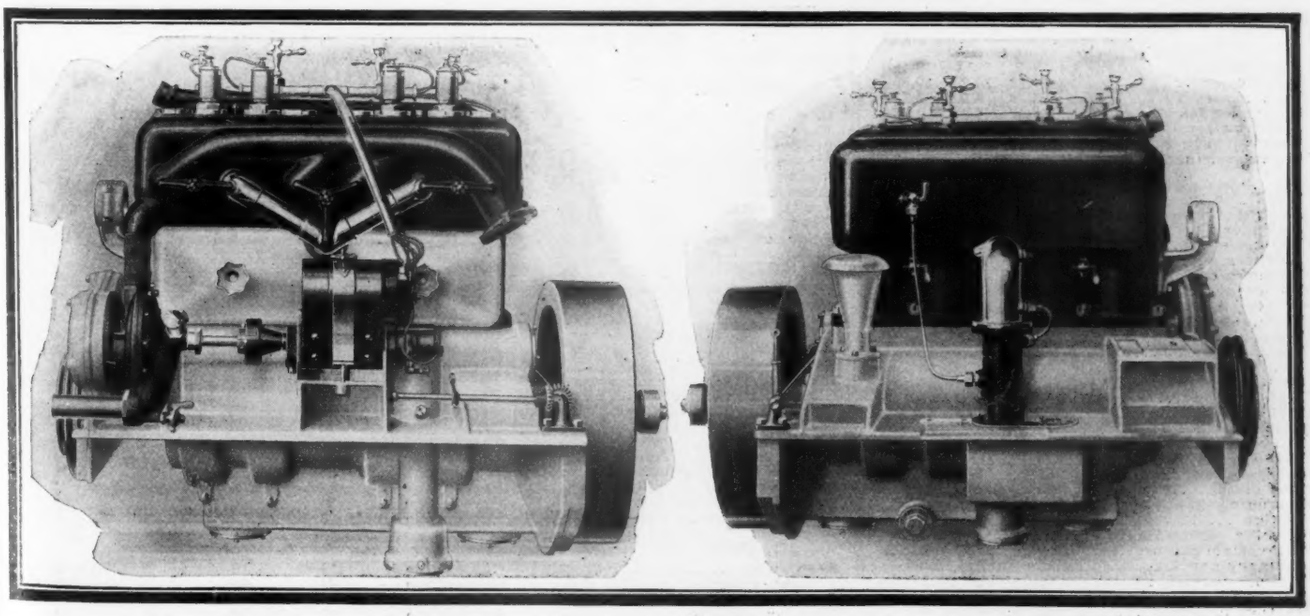
When foundries originally took up the matter of monobloc castings there was a heavy loss due to the high percentage of faulty casting. The intricate cores necessary caused it. Since then foundry art has progressed and now it is possible to make a unit casting which includes the cylinders, the manifolds, the water pipes, waterjackets and in some cases the upper half of the crankcase as well. Although the public hears little about improvement in foundry art, yet it has been a potent factor in the last 2 years and much more will be heard of it during the coming 12 months.

AMERICAN MONOBLOC MOTORS

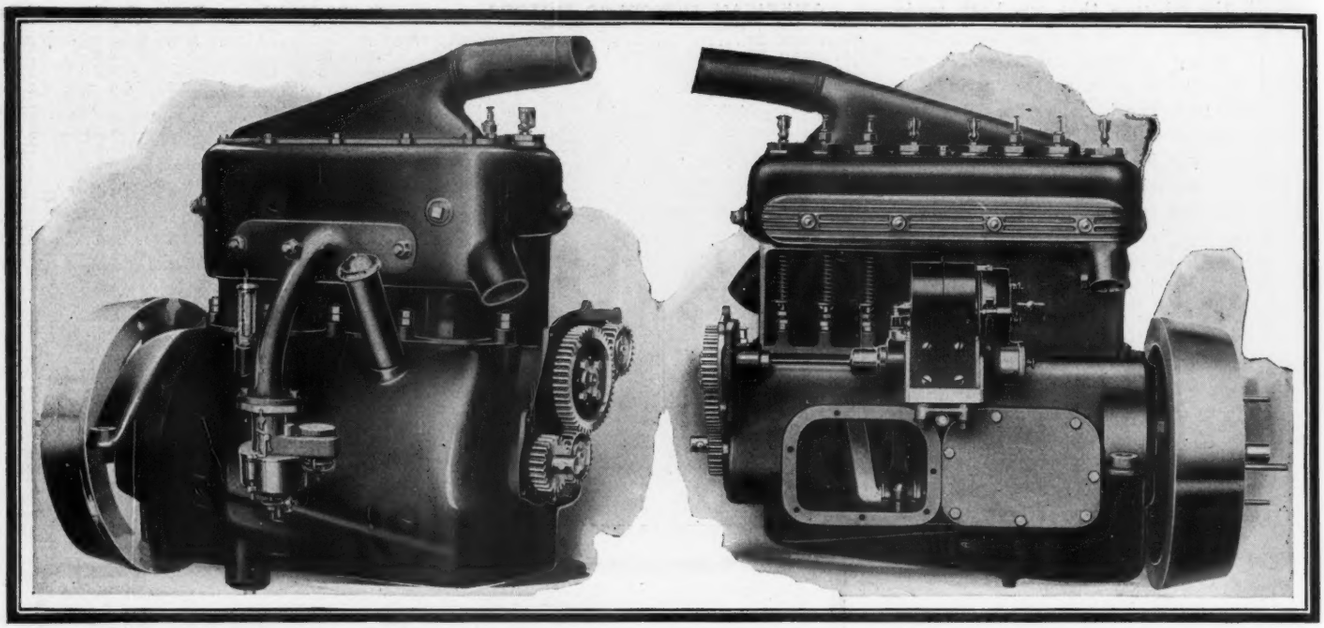
Car and Model	Bore	Stroke	H.P.
American 20	3.75	4.5	22.5
American 30	4.5	5	32.4
Bergdoll C	4	4.5	25.6
Bergdoll D	4	5 15-16	25.6
Carhartt J	4 1-16	4.5	26.4
Chalmers 30	4.5	4.5	25.6
Chalmers 36	4.25	5.25	28.9
Clark T	4 1-16	4.5	26.4
Colby L	4 1-16	4.5	26.4
Courier 1912	3.75	5⅛	22.5
Crawford 12-30	4⅛	4.75	27.3
Crow-Elkhart 50	3.75	4.5	22.5
Crow-Elkhart 52	4	4.5	25.6
Cutting A-30	4	5	25.6
Davis 40	4⅛	5.25	27.3
Everitt 30	4	4.75	25.6
Everitt 4-36	4	4.75	25.6
Everitt 6-48	4	4.75	38.4
Firestone-Colum. 86-D.	4⅛	5.25	27.3
Flanders S	3⅜	3.75	20.3
Flanders S	3⅜	3.75	20.3
Ford T	3.75	4	22.5
Garford G-12	4.25	5.25	28.9
Great Southern 30	4	4.5	25.6
Halladay 30	3.75	5.25	22.5
Henry W	4	4.5	25.6
Henry C	4⅛	5.25	27.3
Herreshoff 25	3⅜	3.75	18.3
Herreshoff 25-Touring.	3⅜	3.75	18.3
Hudson Roadster	4	4.5	25.6
Hudson Touring	4	4.5	25.6
Kenmore D	3⅛	3.25	18.3
King 36	3 13-16	5⅛	23.2
Krit A	3.75	4	22.5
Krit K	3.75	4	22.5
Lambert 66-B	4⅛	4.5	27.3
Lambert 66-C	4⅛	4.5	27.3
Metz 22	3.75	4	22.5
Only	4.25	7⅞	28.9
Paige Beverly	3.75	4	22.5
Pathfinder 40	4⅛	5.25	27.3
Penn RF and T4	3.75	4.5	22.5
Penn TR-T5	4⅛	5.5	27.3
Pilot 40	4.5	5	32.4
R.C.H. Runabout	3.25	5	16.9
R.C.H. Touring	3.25	5	16.9
Reading 40	5	6	40.0
Regal N	3.75	4.5	22.5
Richmond M	4.5	5	32.4
Reader 20	3⅛	4.25	15.6
Schacht B	5⅛	4.5	21.0
Schacht G-F	4 3-16	5	29.2
S. G. V., A	3.75	4⅜	22.5
S. G. V., D	4	5.25	25.6
Staver 35-B	4⅜	5	30.6
Staver 35-F	4.5	5	32.4
Staver 40-F	4.5	5	32.4
Staver 40-RR	4.5	5	32.4
Stoddard-D. Savoy	4	4.5	25.6
Stoddard-D. Stratford.	4.5	5⅛	27.3
Warren 12-30	4	4.5	25.6
Warren 12-35	4⅛	4.5	27.3
Warren 12-40	4.25	4.75	28.9
White GAD	3.75	5.5	22.5
White GB	3.75	5⅛	22.5
White GE	4.75	5⅛	36.1
White	4.25	5.75	43.3



CARBURETER SIDE OF UNIT POWER PLANT OF CHALMERS 36



GARFORD MODEL G MOTOR SHOWING METHOD OF INCLOSING VALVES AND CASTING INTAKE MANIFOLDS

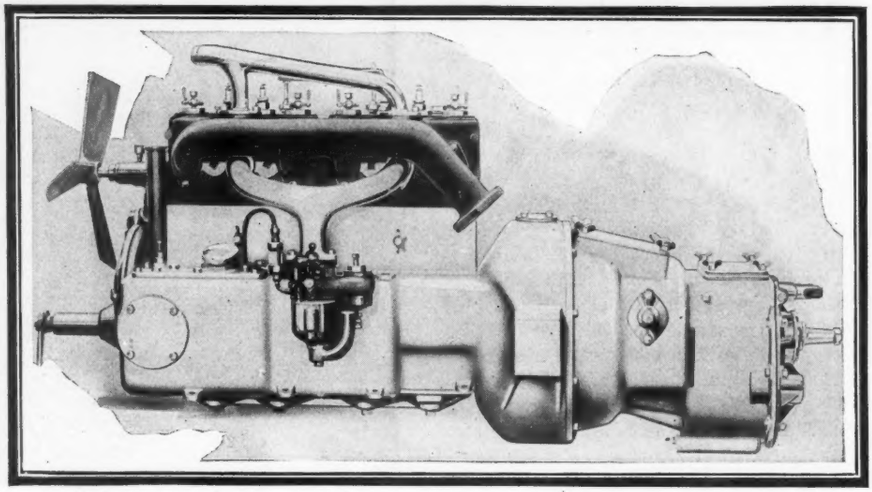


LONG-STROKE R. C. H. MONOBLOC MOTOR

Average Car of 1912

IN the accompanying tables all of the pleasure cars manufactured in America for this year are divided into four classes, that is, $1,000, $1,500, $2,500 and $4,000 classes. The cars in the $1,000 class, include those selling from $350 to $1,250; the $1,500 class includes those from $1,251 to $1,999; the range of the $2,500 car is from $2,000 to $2,999; the $4,000 class includes all cars from $3,000 up. In each class, the average of all the cars with all the different bodies are used in finding the averages of the tire sizes and price, but in all other cases it is the average of all the chassis models in a class upon which the average dimensions or percentages given below are based.

Consideration of the tables compar-



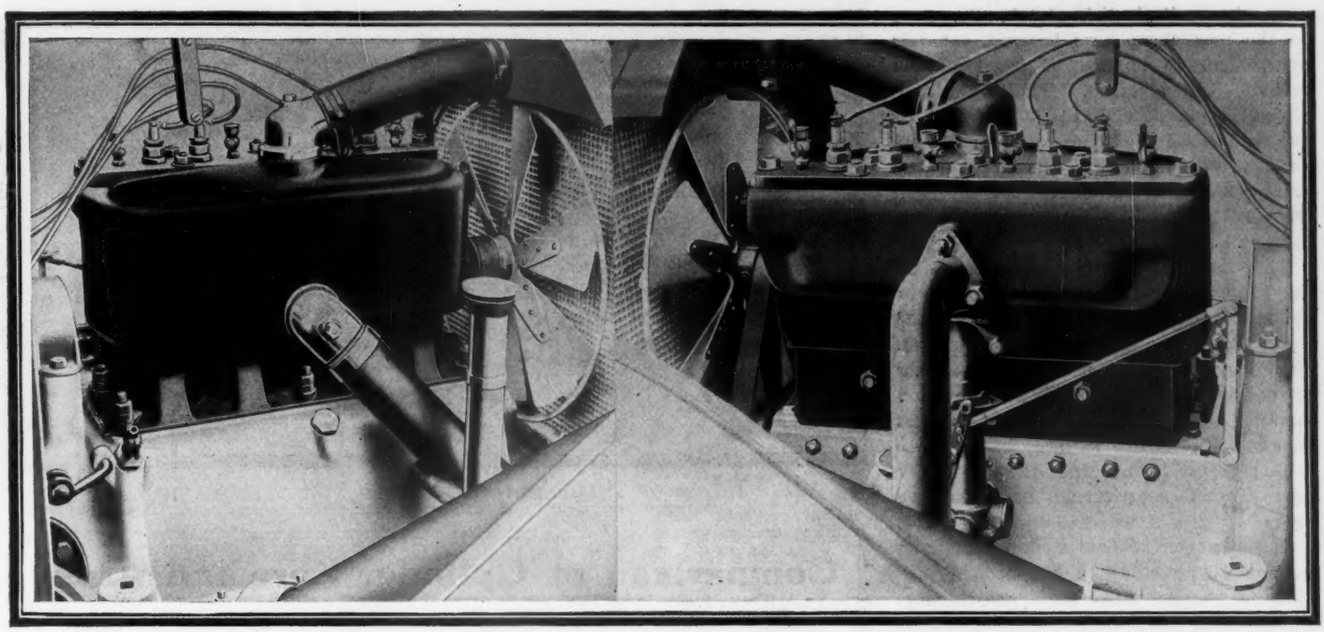
VALVE SIDE OF OAKLAND UNIT POWER PLANT SHOWING VALVE INCLOSURE

$1000 CAR

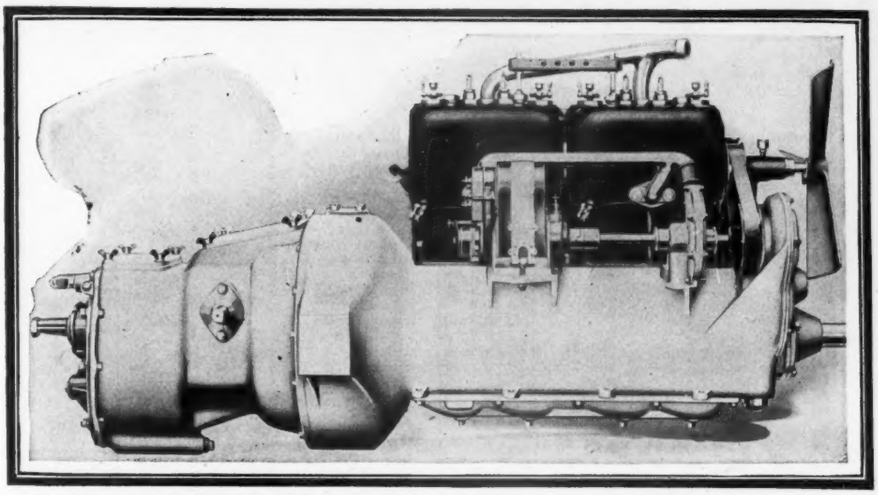
Car part	1912	1911	1910
Horsepower	21.18	21.23	19.85
Bore, inches	3.78	4.01	3.79
Stroke, inches	4.37	4.21	4.25
Stroke-bore ratio	1.15	1.05	1.12
Piston displacem't, cu. in.	186.2	185.8	164.5
Wheelbase, inches	104	100	96
Percentage			
T cylinder type	7	11	13
L cylinder type	74	73	70
I cylinder type	5	10	17
Two-cycle	14	6	0
Cylinders cast separate.	39	40	52
Cylinders cast pairs	32	33	36
Cylinders cast en bloc	31	27	12
Air-cooled	13	15	4
Thermo-syphon	48	61	70
Pump circulating	39	24	30
Tubular radiator	80	81	85
Cellular radiator	20	19	15
Single ignition	38	39	45
Dual ignition	60	48	40
Double ignition	2	13	15
Splash oiling	79	68	85
Oil in fuel	10	0	0
Forced oiling	11	32	15
Multiple-disk clutch	32	49	55
Cone clutch	55	40	33
Expanding band	1	0	4
Friction	12	11	8
Selective gearset	83	68	44
Progressive gearset	0	0	8
Planetary gearset	5	17	40
Friction gearset	12	15	8
Gravity fuel feed	97	96	97
Pressure fuel feed	3	4	3
Shaft drive	86	80	80
Chain drive	12	18	18
Roller	2	2	2

FOUR AVERAGE AMERICAN CARS FOR 1912

AVERAGE		$1,000 Car	$1,500 Car	$2,500 Car	$4,000 Car
S. A. E.	Horsepower	21.18	30.01	35.45	43.40
Bore	Inches	3.78	4.26	4.40	4.65
Stroke	Inches	4.37	4.86	5.00	5.41
Stroke-bore ratio	Inches	1.15	1.14	1.13	1.16
Piston displacement	Cubic Inches	186.2	266.5	336.5	453.0
Wheelbase	Inches	104	116	120	129
Front wheel	Inches	32x3½	34x4	36x4	36x4½
Rear wheel	Inches	32x3½	34x4	36x4	37x5
Price of car		$954	$1,595	$2,570	$4,350
MOTOR					
Number of cylinders					
One	Percentage	1	0	0	0
Two	Percentage	10	0	0	0
Three	Percentage	2	0	0	0
Four	Percentage	87	95	86	55
Five	Percentage	0	0	0	1
Six	Percentage	0	5	14	44
Sleeve-valve type	Percentage	0	0	0	6
T type	Percentage	7	15	43	52
L type	Percentage	74	78	50	26
I type	Percentage	5	6	6	15
Two-cycle	Percentage	14	2	1	1
Cylinders cast separately	Percentage	39	24	15	18
Cylinders cast in pairs	Percentage	32	45	68	74
Cylinders cast en bloc	Percentage	31	30	11	5
Cylinders cast in threes	Percentage	0	1	6	3
COOLING					
Air-cooled	Percentage	13	3	2	3
Thermo-syphon	Percentage	48	31	1	3
Pump circulating	Percentage	39	66	97	94
Tubular radiator	Percentage	80	50	35	23
Cellular radiator	Percentage	20	50	65	77



NEW HUPMOBILE LONG-STROKE MOTOR



RIGHT SIDE OF OAKLAND POWER PLANT WITH CYLINDERS CAST IN PAIRS

Chassis Development

ing the four classes of cars for this year with cars in the corresponding classes of 1911 and 1910, there will be seen a steady development in the cars as a whole as to other points aside from that of motor design. Looking at the average car in the $1,000 class, there will be seen a regular lengthening of the wheelbase from 96 inches in 1910 to 100 inches in 1911, while this year's car has an average of 104 inches. This growth means more than the simple fact that the bodies are longer. It means increased ease of riding, it means roomier quarters both in front and in the tonneau.

A feature of chassis design particularly noticeable in this class is the increasing employment of the cone clutch

FEATURES OF AMERICAN CARS FOR 1912

		$1,000 Car	$1,500 Car	$2,500 Car	$4,000 Car
IGNITION					
Single	Percentage	38	12	6	7
Dual	Percentage	60	75	61	50
Double	Percentage	2	13	33	41
Magnetic plugs		0	0	0	2
Hand-controlled	Percentage	82	95	97	97
Governor-controlled	Percentage	0	0	2	3
Fixed control	Percentage	18	5	1	0
LUBRICATION					
Splash	Percentage	79	92	77	62
Forced	Percentage	11	8	22	38
Oil with fuel	Percentage	10	0	1	0
GEARSET					
Selective	Percentage	83	93	99	94
Planetary	Percentage	5	1	0	0
Progressive	Percentage	0	0	0	6
Friction	Percentage	12	6	1	0
NO. FORWARD SPEEDS					
Five	Percentage	2	0	0	0
Four	Percentage	0	3	13	45
Three	Percentage	75	90	86	55
Two	Percentage	15	1	0	0
Any	Percentage	8	6	1	0
DRIVE					
Shaft	Percentage	86	95	99	93
Chain	Percentage	12	5	1	5
Roller	Percentage	2	0	0	0
Shaft with worm	Percentage	0	0	0	2
REAR AXLE					
Floating	Percentage	2	47	75	66
Semi-floating	Percentage	83	52	25	29
Dead	Percentage	15	1	0	5
CLUTCH					
Mult. disk	Percentage	32	40	45	56
Cone	Percentage	55	51	48	37
Expanding band	Percentage	1	2	5	6
Friction	Percentage	12	6	1	0
Contracting band	Percentage	0	1	1	1

$1500 CAR

Car part	1912	1911	1910
Horsepower	30.01	29.53	27.2
Bore, inches	4.26	4.19	4.14
Stroke, inches	4.86	4.64	4.41
Stroke-bore ratio	1.14	1.10	1.06
Piston displacem't, cu. in.	266.5	262.0	238.0
Wheelbase, inches	116	114	109
Percentage			
T cylinder type	15	10	10
L cylinder type	78	70	87
I cylinder type	6	18	3
Two-cycle	2	2	0
Cylinders cast separate	24	21	58
Cylinders cast pairs	45	60	18
Cylinders cast en bloc	30	19	24
Cylinders cast threes	1	0	0
Air-cooled	3	3	8
Thermo-syphon	31	48	42
Pump circulating	66	49	50
Tubular radiator	50	75	90
Cellular radiator	50	25	10
Single ignition	12	16	8
Dual ignition	75	67	49
Double ignition	13	17	43
Splash oiling	92	94	92
Forced oiling	8	6	8
Multiple-disk clutch	40	47	53
Cone clutch	51	45	39
Expanding band	2	1	3
Friction	6	7	5
Contracting band	1	0	0
Selective gearset	93	91	66
Progressive gearset	0	0	3
Planetary gearset	1	2	26
Friction gearset	6	7	5
Gravity fuel feed	90	93	81
Pressure fuel feed	10	7	19
Shaft drive	95	91	88
Chain drive	5	9	19

over the multiple-disk clutch, due more to the new cheap cars brought out this year, than to change of heart of old makers. For instance, for 1910 the multiple-disk clutch claimed 55 per cent of the field while the cone clutch was found on 33 per cent of the models in the $1,000 class. This year the figures are reversed, 55 per cent of the cars employing the cone and 32 per cent the multiple-disk.

That the $1,000 car is steadily approaching in general design the specifications of its higher-priced brothers is illustrated very forcibly in the matter of gearset. The general replacement of all other types of gearset by the selective is a criterion of the development of this class of car. This is due in most instances to the makers abandoning the planetary gearset and substituting the selective years.

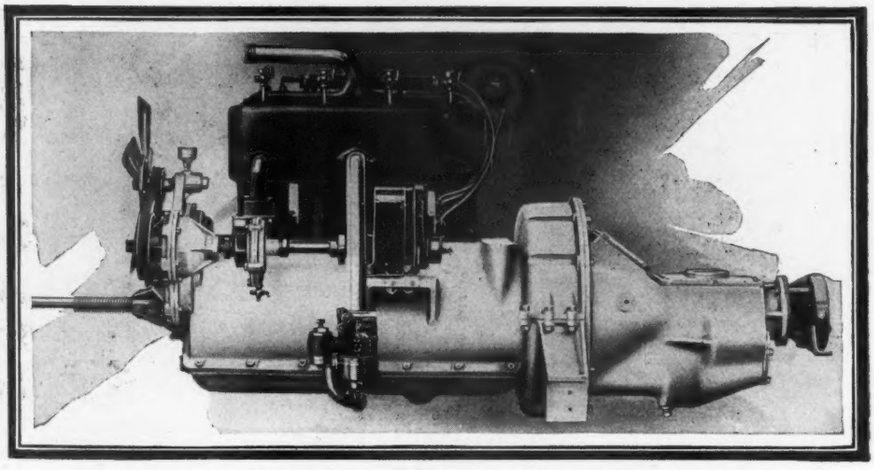
In the matter of final medium of transmission of power there has been a perceptible change since last year, eighty-six per cent of the cars carrying shafts as against the 80 per cent represented for the 2 years preceding. Chain drive has lost ground somewhat, dropping from 18 per cent it held in the 2 preceding years to 12 per cent in 1912. The roller drive, by which power is transmitted directly from the motor to the rear wheels by roller on the transverse crankshaft of the motor, has between 1 and 2 per cent, its sole representative being the Duryea product.

Passing to the cars which are listed between $1,250 and $2,000 and which may be designated as the $1,500 class, we find that the average car for this year shows development along practically the same lines as does the car of lower price. In the wheelbase for instance, there is a general increase from 109 inches in 1910 to 114 in 1911 and to 116 inches for this year.

In gearset design the same advance as was noted for the $1,000 class may be

$2500 CAR

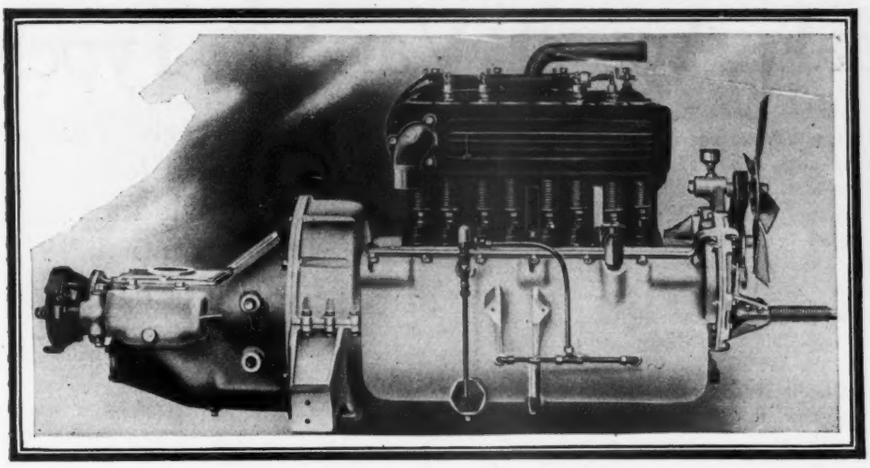
Car part	1912	1911	1910
Horsepower	35.45	35.60	30.65
Bore, inches	4.40	4.43	4.31
Stroke, inches	5.00	4.96	4.75
Stroke-bore ratio	1.13	1.12	1.07
Piston displacem't, cu. in.	336.5	324.2	287.9
Wheelbase, inches	120	119	113
Percentage			
T cylinder type	43	28	25
L cylinder type	50	57	54
I cylinder type	6	13	14
Two-cycle	1	2	7
Cylinders cast separate	15	29	32
Cylinders cast pairs	68	67	58
Cylinders cast en bloc	11	4	10
Cylinders cast threes	6	0	0
Air-cooled	2	3	5
Thermo-Syphon	1	3	25
Pump circulating	97	94	70
Tubular radiator	35	46	55
Cellular radiator	65	54	45
Single ignition	6	10	29
Dual ignition	61	50	32
Double ignition	33	40	39
Splash oiling	77	88	76
Oil in fuel	1	0	0
Forced oiling	22	12	24
Multiple-disk clutch	45	38	41
Cone clutch	48	50	35
Expanding band	5	6	12
Friction	1	0	2
Contracting band	1	6	10
Selective gearset	99	100	93
Progressive gearset	0	0	5
Friction gearset	1	0	2
Gravity fuel feed	75	75	96
Pressure fuel feed	25	25	4
Shaft drive	99	100	96
Chain drive	1	0	4



MOTOR OF AMERICAN SCOUT WITH CAST INTAKE MANIFOLD

Comparison of Cylinder Bore and Stroke

Name of Car	Bore in Inches	Stroke in Inches	Ratio of Stroke to Bore
Only	4 1/4	7 7/8	1.85 to 1
Hupmobile	3 1/4	5 1/2	1.69 to 1
Austin	4 1/2	7	1.56 to 1
R. C. H.	3 1/4	5	1.54 to 1
Moline	4	6	1.50 to 1
Oldsmobile	4	6	1.50 to 1
Bergdoll	4	5 15-16	1.49 to 1
Mitchell	3 3/4	5 1/2	1.46 to 1
Dispatch	3 1/2	5	1.43 to 1
Halladay	3 3/4	5 1/4	1.40 to 1
Pierce-Arrow	5	7	1.40 to 1
Peerless	5	7	1.40 to 1
Rayfield	3 9-16	5	1.40 to 1
Courier	3 3/4	5 1/8	1.37 to 1
Peerless	4	5 1/2	1.37 to 1
Austin	4 1/2	6	1.36 to 1
Fiat	4 2-5	6	1.36 to 1
White	3 3/4	5 1/8	1.36 to 1
Roader	3 1/8	4 1/4	1.36 to 1
King	3 13-16	5 1/8	1.35 to 1
White	4 1/4	5 3/4	1.35 to 1
Havers	3 3/4	5	1.33 to 1
Peerless	4 1/2	6	1.33 to 1
Penn	4 1/8	5 1/2	1.33 to 1
Simplex	4 7/8	6 1/2	1.33 to 1
Spoerer	4 1/8	5 1/2	1.33 to 1
Marion	4 1/8	5 1/2	1.32 to 1
S. G. V.	4	5 1/4	1.31 to 1
Klinekar	4 1/4	5 1/2	1.29 to 1
Stearns-Knight	4 1/4	5 1/2	1.29 to 1
Thomas	4 1/4	5 1/2	1.29 to 1
Suburban	3 1/2	4 1/2	1.28 to 1
Alpena	4 1/8	5 1/4	1.27 to 1
Ames	4 1/8	5 1/4	1.27 to 1
Arbenz	4 1/8	5 1/4	1.27 to 1
Auburn	4 1/8	5 1/4	1.27 to 1
Babcock	4 1/8	5 1/4	1.27 to 1
Clark	4 1/8	5 1/4	1.27 to 1
Colby	4 1/8	5 1/4	1.27 to 1
Davis	4 1/8	5 1/4	1.27 to 1
Great Eagle	4 1/8	5 1/4	1.27 to 1
Henry	4 1/8	5 1/4	1.27 to 1
Imperial	4 1/8	5 1/4	1.27 to 1
Lambert	4 1/8	5 1/4	1.27 to 1
Lenox	4 1/8	5 1/4	1.27 to 1
Lexington	4 1/8	5 1/4	1.27 to 1
Shelby	4 1/8	5 1/4	1.27 to 1
Spaulding	4 1/8	5 1/4	1.27 to 1
Pierce-Arrow	4	5 1/8	1.27 to 1
Brush	4	5	1.25 to 1
Cino	4	5	1.25 to 1
Coey	4	5	1.25 to 1
Cutting	4	5	1.25 to 1
Marion	4	5	1.25 to 1
McFarlan	4	5	1.25 to 1
McIntyre	4	5	1.25 to 1
Packard	4 1-16	5 1/8	1.25 to 1
Palmer-Sing.	4	5	1.25 to 1
Pope	4 5-16	5 3/8	1.24 to 1
Chalmers	4 1/4	5 1/4	1.23 to 1
Colby	4 1/4	5 1/4	1.23 to 1
Garford	4 1/4	5 1/4	1.23 to 1
Maxwell	4 1/4	5 1/4	1.23 to 1
National	4 7/8	6	1.23 to 1
Stuyvesant	4 7/8	6	1.23 to 1
Abbott	4 1/2	5 1/2	1.22 to 1
Atlas	4 1/2	5 1/2	1.22 to 1
Jonz	4 1/2	5 1/2	1.22 to 1
Crawford	4 1/2	5 1/2	1.22 to 1
Firestone	4 1/2	5 1/2	1.22 to 1
Haynes	4 1/2	5 1/2	1.22 to 1
Imperial	4 5-16	5 1/4	1.22 to 1
Inter-State	4 1/2	5 1/2	1.22 to 1
Jonz	4 1/2	5 1/2	1.22 to 1
Klinekar	4 3-32	5	1.22 to 1
Packard	4 1/2	5 1/2	1.22 to 1
Pierce-Arrow	4 1/2	5 1/2	1.22 to 1
Pullman	4 1-16	5	1.22 to 1
Pullman	4 1/2	5 1/2	1.22 to 1
Stoddard	4 1/2	5 1/2	1.22 to 1
W. F. S.	4 1/2	5 1/2	1.22 to 1
Cunningham	4 3/4	5 3/4	1.21 to 1
American	3 3/4	4 1/2	1.20 to 1
Austin	4 3/8	5 1/4	1.20 to 1
Chadwick	5	6	1.20 to 1
Crow-Elkhart	3 3/4	4 1/2	1.20 to 1
G. J. G.	3 3/4	4 1/2	1.20 to 1
Inter-State	5	6	1.20 to 1
Olds	5	6	1.20 to 1
Overland	3 3/4	4 1/2	1.20 to 1
Packard	5	6	1.20 to 1
Penn	3 3/4	4 1/2	1.20 to 1
Petrel	3 3/4	4 1/2	1.20 to 1
Reading	5	6	1.20 to 1
Regal	3 3/4	4 1/2	1.20 to 1
Schlosser	5	6	1.20 to 1
Stoddard	4 1/4	5 1/8	1.20 to 1
Everitt	4	4 3/4	1.19 to 1
Franklin	3 3/8	4	1.19 to 1
Lozier	4 5/8	5 1/2	1.19 to 1
Berkshire	4 11-16	5 1/2	1.17 to 1
Case	4 1/4	5	1.17 to 1
Correja	4 1/4	5	1.17 to 1
Dalton	3 3/8	4 1/4	1.17 to 1
DeTamble	4 1/4	5	1.17 to 1
Firestone	4 1/8	5 1/4	1.17 to 1
Gt. Southern.	5 1/8	6	1.17 to 1
Gt. Western.	4 1/4	5	1.17 to 1
Haynes	4 1/4	5	1.17 to 1
Imperial	4 1/4	5 1/4	1.17 to 1
Johnson	4 1/2	5 1/4	1.17 to 1
Leader	4 1/2	5 1/4	1.17 to 1
Locomobile	4 1/4	5	1.17 to 1
McFarland	4 1/4	5	1.17 to 1
Oakland	4 1/2	5 1/4	1.17 to 1
Paterson	4 1/2	5 1/4	1.17 to 1
Premier	4 1/2	5 1/4	1.17 to 1
Republic	4 1/4	5	1.17 to 1
S. G. V.	3 3/4	4 3/8	1.17 to 1
Triumph	4 1/4	5	1.17 to 1
Velie	4 1/2	5 1/4	1.17 to 1
Wilcox	4 1/4	5	1.17 to 1
Cartercar	4 1/2	5 1/4	1.16 to 1
Case	4 1/2	5 1/4	1.16 to 1
Cole	4 1/2	5 1/4	1.16 to 1
Four-Wheel	4 3/4	5 1/2	1.16 to 1
Jenkins	4 3/4	5 1/2	1.16 to 1
Pope-H'tfd	4 3/4	5 1/2	1.16 to 1
Stuyvesant	4 3/4	5 1/2	1.16 to 1
Alco	4 3/4	5 1/2	1.15 to 1
Babcock	4 3/4	5 1/2	1.15 to 1
Cartercar	4 1/8	4 3/4	1.15 to 1
Corbin	4 3/4	5 1/2	1.15 to 1
Crawford	4 1/8	4 3/4	1.15 to 1
Crow-Elkhart	4 1/8	4 3/4	1.15 to 1
Cutting	4 3/4	5 1/2	1.15 to 1
Klinekar	4	4 5/8	1.15 to 1
Midland	4 9-25	5	1.15 to 1
Motorette	3 1/4	3 3/4	1.15 to 1
Oakland	4 1/8	4 3/4	1.15 to 1
Peerless	4	4 5/8	1.15 to 1
Schacht	4 5-16	5	1.15 to 1
Zimmerman	4 5-16	5	1.15 to 1
Cino	4 3/8	5	1.14 to 1
Crow-Elkhart	4 3/8	5	1.14 to 1
Dorris	4 3/8	5	1.14 to 1
Marathon	4 1/2	5 1/8	1.14 to 1
Mercer	4 3/8	5	1.14 to 1
National	5	5 11-16	1.14 to 1
Staver	4 3/8	5	1.14 to 1
Carhartt	4 7/8	5 1/2	1.13 to 1
Columbia	4 7/8	5 1/2	1.13 to 1



UNIT POWER PLANT OF AMERICAN SCOUT

Sizes of American Motors for 1912

Name of Car	Bore in Inches	Stroke in Inches	Ratio of Stroke to Bore
Jonz	3¾	4¼	1.13 to 1
Palmer-Sing.	4⅞	5½	1.13 to 1
Spoerer	4⅞	5½	1.13 to 1
Bergdoll	4	4½	1.12 to 1
Chalmers	4	4½	1.12 to 1
Corbitt	4	4½	1.12 to 1
Crow-Elkhart	4	4½	1.12 to 1
Day Utility	4	4½	1.12 to 1
E-M-F	4	4½	1.12 to 1
Gt. Southern	4	4½	1.12 to 1
Henry	4	4½	1.12 to 1
Hudson	4	4½	1.12 to 1
Illinois	4¼	4¾	1.12 to 1
Marathon	4	4½	1.12 to 1
Marion	4	4½	1.12 to 1
Overland	4	4½	1.12 to 1
Reo	4	4½	1.12 to 1
Richmond	4	4½	1.12 to 1
Sebring	3 9-16	4	1.12 to 1
Stafford	4⅛	4⅝	1.12 to 1
Stevens	4¼	4¾	1.12 to 1
Stoddard	4	4½	1.12 to 1
Warren	4	4½	1.12 to 1
Warren	4¼	4¾	1.12 to 1
American	4½	5	1.11 to 1
Apperson	4½	5	1.11 to 1
Auburn	4½	5	1.11 to 1
Babcock	4½	5	1.11 to 1
Buick	4½	5	1.11 to 1
Carhartt	4 1-16	4½	1.11 to 1
Crow-Elkhart	4½	5	1.11 to 1
Firestone	4½	5	1.11 to 1
Grout	4½	5	1.11 to 1
Halladay	4½	5	1.11 to 1
Herreshoff	3⅜	3¾	1.11 to 1
Inter-State	4½	5	1.11 to 1
Lambert	4½	5	1.11 to 1
Lexington	4½	5	1.11 to 1
Lion	4½	5	1.11 to 1
Lozier	5¾	6	1.11 to 1
Marmon	4½	5	1.11 to 1
Matheson	4½	5	1.11 to 1
Mercer	4½	5	1.11 to 1
Midland	4½	5	1.11 to 1
Mitchell	4½	5	1.11 to 1
Moon	4½	5	1.11 to 1
Pilot	4½	5	1.11 to 1
Richmond	4½	5	1.11 to 1
Staver	4½	5	1.11 to 1
Westcott	4½	5	1.11 to 1
Winton	4½	5	1.11 to 1
Johnson	5	5½	1.10 to 1
Knox	5	5½	1.10 to 1
Clark	4 1-16	4½	1.10 to 1
Colby	4 1-16	4½	1.10 to 1
Franklin	3⅝	4	1.10 to 1
Gärford	4¾	5¼	1.10 to 1
Haynes	5	5½	1.10 to 1
Imperial	4¾	5¼	1.10 to 1
Peerless	5	5½	1.10 to 1
Rambler	5	5½	1.10 to 1
Stoddard	5	5½	1.10 to 1
Union	3⅝	4	1.10 to 1
Lambert	4⅛	4½	1.09 to 1
Overland	4⅛	4½	1.09 to 1
Warren	4⅛	4½	1.09 to 1
Luverne	4⅜	4¾	1.08 to 1
Morse	4⅝	5	1.08 to 1
Pathfinder	4⅞	5¼	1.08 to 1
Petrel	4⅜	4¾	1.08 to 1
Standard	4¼	4½	1.08 to 1
White	4¾	5⅛	1.08 to 1
Ford	3¾	4	1.07 to 1
Krit	3¾	4	1.07 to 1
Marathon	3¼	3½	1.07 to 1
Marathon	4¼	4½	1.07 to 1
Metz	3¾	4	1.07 to 1

Name of Car	Bore in Inches	Stroke in Inches	Ratio of Stroke to Bore
Johnson	4¼	4½	1.06 to 1
Otto	4¼	4½	1.06 to 1
Paige	3¾	4	1.06 to 1
Regal	4¼	4½	1.06 to 1
Alco	5¼	5½	1.05 to 1
Apperson	4¾	5	1.05 to 1
Columbia	4⅞	5⅛	1.05 to 1
Frontenac	4¾	5	1.05 to 1
G. J. G.	4¾	5	1.05 to 1
Glide	4¾	5	1.05 to 1
Great Eagle	4¾	5	1.05 to 1
Grout	4¾	5	1.05 to 1
Halladay	4¾	5	1.05 to 1
Hupmobile	3¼	3⅜	1.05 to 1
Kisselkar	4½	4¾	1.05 to 1
Luverne	4¾	5	1.05 to 1
Marquette	5	5¼	1.05 to 1
Moon	4¾	5	1.05 to 1
Ohio	4½	4¾	1.05 to 1
Pratt	4 1-3	4¾	1.05 to 1
Selden	4¾	5	1.05 to 1
Stoddard	4¾	5	1.05 to 1
Westcott	4¾	5	1.05 to 1
Ritter	3¼	3⅜	1.04 to 1
Abbott	4⅛	4¼	1.03 to 1
Autocar	4⅜	4½	1.03 to 1
Flanders	3⅝	3¾	1.03 to 1
Octoauto	4⅜	4½	1.03 to 1
Overland	4⅜	4½	1.03 to 1
American	5⅜	5½	1.02 to 1
Kisselkar	4⅞	5	1.02 to 1
Alpena	4	4	1.00 to 1
Amplex	4½	4½	1.00 to 1
Atlas	4½	4½	1.00 to 1
Auburn	4	4	1.00 to 1
Buick	3¾	3¾	1.00 to 1
Buick	4	4	1.00 to 1
Buick	4½	4½	1.00 to 1
Cartercar	4	4	1.00 to 1
Crawford	4½	4½	1.00 to 1
Duryea	3¾	3¾	1.00 to 1
Franklin	4	4	1.00 to 1
Jackson	4	4	1.00 to 1
Jackson	4½	4½	1.00 to 1
Kisselkar	4¼	4¼	1.00 to 1
Locomobile	4½	4½	1.00 to 1
Marquette	5	5	1.00 to 1
Maxwell	4	4	1.00 to 1
Maxwell	4¼	4¼	1.00 to 1
Oakland	4	4	1.00 to 1
Paterson	4	4	1.00 to 1
Pickard	4	4	1.00 to 1
Rambler	4½	4½	1.00 to 1
Spaulding	4	4	1.00 to 1
Simplex	5¾	5¾	1.00 to 1
Speedwell	5	5	1.00 to 1
Virginian	5	5	1.00 to 1
Amplex	5 1-16	5	.99 to 1
Cameron	3⅞	3¾	.97 to 1
Ohio	4 15-16	4¾	.97 to 1
Regal	4⅛	4	.97 to 1
Kenmore	3⅜	3¼	.96 to 1
Knox	5	4¾	.95 to 1
Stevens	4¾	4½	.95 to 1
Corbin	4½	4¼	.94 to 1
Adams-Far.	5½	5	.91 to 1
Apperson	5½	5	.91 to 1
Elmore	4½	4	.89 to 1
Maxwell	4½	4	.89 to 1
Elmore	4	3½	.88 to 1
Schacht	5⅛	4½	.88 to 1
Rogers	4¾	4	.84 to 1
Anna	5¼	4	.76 to 1

seen in the $1,500 class although it is not nearly so pronounced. Two years ago two-thirds of the cars in this class were supplied with selective gearsets while 26 per cent of them had planetary gearsets and 3 per cent had progressive. Last year there was 91 per cent of the models in this class with selective gearsets, no progressive and 2 per cent planetary while this year the planetary gearsets have dropped to 1 per cent and the selective has 93 per cent.

The development of the $2,500 car along the lines we have been discussing is not so noticeable as in the cheaper classes nor is it so great for the past year as in the year preceding that. In other words, it would seem that, so far as chassis design outside of the motor is concerned, makers of cars in this class are pretty well content with last year's construction and are willing to stand pat to a certain extent. In the matter of wheelbase among the cars listing from $2,000 to $3,000 there will be found a lengthening of 1 inch on the last year's average as against 6 inches difference between the 2 preceding years.

In the fourth and last class there is if anything more of development along the lines under consideration than in the class immediately below it. The 1912 cars ranging in price from $3,000 upward there has been a decided increase in length of wheelbase which may be attributed perhaps above everything to the development of interest in touring. As will be seen, it has increased 5 inches this year while there was no increase at all during the year preceding. The length of 124 inches, which was the average for 1910, remained the same in 1911, but has been increased to 129 for the coming season. In the matter of clutch design a condition opposite to that shown in the $2,500 class will be found.

$4000 CAR

Car part	1912	1911	1910
Horsepower	43.40	43.66	46.65
Bore, inches	4.65	4.87	4.76
Stroke, inches	5.41	5.39	5.11
Stroke-bore ratio	1.16	1.10	1.07
Piston displacem't, cu. in.	453.0	447.3	436.45
Wheelbase, inches	129	124	124
Percentage			
Sleeve-valve type	6	0	0
T cylinder type	52	34	53
L cylinder type	26	38	26
I cylinder type	15	27	17
Two-cycle	1	1	4
Cylinders cast separate	18	19	25
Cylinders cast pairs	74	79	74
Cylinders cast en bloc	5	1	1
Cylinders cast threes	3	0	0
Air-cooled	3	4	4
Thermo-syphon	3	1	2
Pump circulating	94	95	94
Tubular radiator	23	35	45
Cellular radiator	77	65	55
Single ignition	7	7	11
Dual ignition	50	50	39
Double ignition	41	43	47
Make-and-break	0	0	3
Magnetic spark plugs	2	0	0
Splash oiling	62	14	85
Forced oiling	38	26	15
Multiple-disk clutch	56	60	46
Cone clutch	37	29	42
Expanding band	6	0	7
Friction	0	1	0
Contracting band	1	8	5
Selective gearset	94	100	98
Progressive gearset	6	0	2
Gravity fuel feed	57	60	64
Pressure fuel feed	43	40	36
Shaft drive	93	95	96
Chain drive	5	5	4
Shaft with worm gear	2	0	0

Warning Signals Are of Various Types

Three Separate and Distinct Divisions Noted, Electric, Exhaust and the Old-Fashioned Bulb—Improvements in 1912 Noise-Producing Instruments

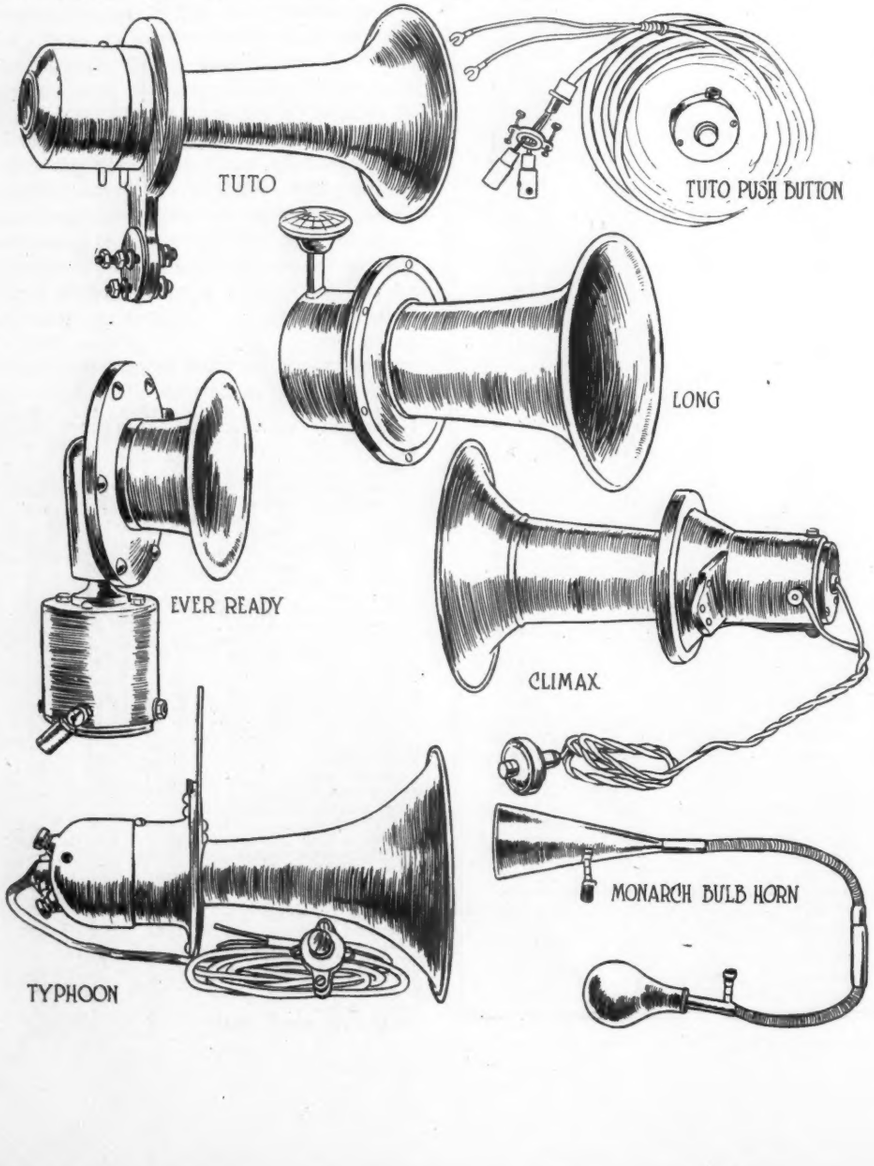
MODERN needs of motorists have divided the horn field into three distinct divisions, each of which has its following—the electric, the exhaust and the bulb. Developments during the past year have wrought no radical changes, although there has been a general refining of the instruments that is noticeable. Serviceability long ago was reached, but there have been added little frills, which tend to make for the comfort and convenience of the driver, which is the aim nowadays not only of the car maker, but of the accessory manufacturer as well.

The bulb horn is of course the pioneer so far as the warning signals go, but its rivals have encroached on its territory to such an extent that nowadays it finds it hard work to hold the pace. The bulb horn, though, has been taken into partnership with the electric signal, and the developments in the latter field during the year have been mostly in the way of bringing out a combination horn in which the bulb is incorporated. This combination is aimed to get around the laws that exist in some cities where the loud electric signal is forbidden. With the combination, the bulb can be used on city streets and the driver has the electric signal, with its warning note that carries great distances, for use in the country.

Experts say that the exhaust type of signal has received the most attention on the part of the inventors who have been working with considerable success on the one point that can be criticized in this type. This is to devise a means whereby the air orifice can be protected from the invasion of soot and carbon which often clog the air orifice and hamper the noise-producing qualities of the device.

The electric field is sub-divided. In the diaphragm class there is still another subdivision, one type producing its warning by having the diaphragm vibrated by means of an electric motor and the other by electro-magnetic means. In either case a battery or dry cell current is needed, in one case to drive the motor and in the other to operate the electro-magnetic arrangement.

Where the electric motor is used, there is one instance where the motor when rotating drives a star wheel, which strikes upon a hardened steel rivet in the center of the vibrating diaphragm. As the motor rotates at great speed the diaphragm vibrations are ten times as great, due to there being ten teeth on the star wheel and also that each tooth gives one vibration.



One method used for operating a horn on the electro-magnetic principle is to run the battery current through a coil with a soft iron core. From this coil current flows through a contact screw and thence to a vibrating armature and back to the battery. When the circuit is closed the current flowing through the coil forms a temporary magnet of the soft iron core. This attracts the vibrating armature towards it, and immediately the circuit is broken. The vibrating armature, however, has hit a pin which is attached to the center of the diaphragm, causing a vibration of the diaphragm. In some instances there are more than one point of contact. The rapid vibration of the diaphragm produces the noise. The turbine type of horn, such as is the Sireno, has the electric motor on the same shaft as the turbine, so the faster the turbine rotates on its axis the higher the tone.

Monarch—Bulb horns of all sizes and shapes are made by the U. S. Auto Horn Co., which has the Monarch for one of its leaders. All horns are furnished with either straight or lyre brackets and the dragon type can be had with the bell pointing down.

Melody—This is one of the exhaust family which is operated in connection with the Hux horn valve, there being a neat pedal on the footboard which operates a chain which connects with the cutout valve. This combination does away with an extra muffler cutout valve as both horn valve and muffler cutout are combined in one in the Hux.

F. & K. Chime Horn—This Findeisen & Kropf device is made to be used in connection with the Husk valve, which of course brings it into the exhaust horn category. As is usual with this type, the power for blowing the horn is furnished by the exhaust of the motor, the chime being controlled by means of a foot pedal on the footboard.

Exo—Another exhaust horn, the Exo, clamps around the end of the muffler outlet pipe and is operated by a foot pedal on the toe board. When not in use the spring attached to the signal and clamping portion of the same draws the signal far

Trend of the Times Among the Horns

In Diaphragm Class One Lot Uses Motor While Other Secures Results by the Electro-Magnetic Means—Some Examples of Different Styles

back so the exhaust has free access to the open air. Depressing the foot causes the signal to raise and the exhaust to flow through the elongated chamber and across two brass tubes which are the sound-producers.

Skinner Cut-O-Fone—This exhaust whistle, which is installed on the exhaust pipe line between the engine and muffler, is operated by means of a push button pedal beside the clutch pedal, the button automatically returning to its position after being released by the foot unless it is pushed forward when the whistle assumed a neutral position and gives a silent, unobstructed passage to the muffler.

Barco Chimes—The Barco belongs to the exhaust family, being installed between the engine and the muffler by clamping on the exhaust valve and attaching the horn in a convenient location, the horn and valve being operated by a foot pedal located on the foot board. The feature claimed for the Barco is that it gives an unobstructed passage for the exhaust and can be taken apart without removing the body from the car.

Nightingale Whistle—This is an exhaust-blown whistle that formerly was made by the Finance Developing Co. but which now is a part of the line of the Riley-Klotz Mfg. Co., which also makes megaphone horns for limousine cars and other accessories. The Nightingale is one of the oldest on the market and there has been no change in it for the past year.

Gabriel—To the long established line of Gabriel horns, operated by the exhaust, has been added a new ten-tube horn for use on cars of 30-horsepower and under. It is similar to its older brother except that it is smaller in size. Besides the ten-tube there are the single-tube and the trumpet horns in this line.

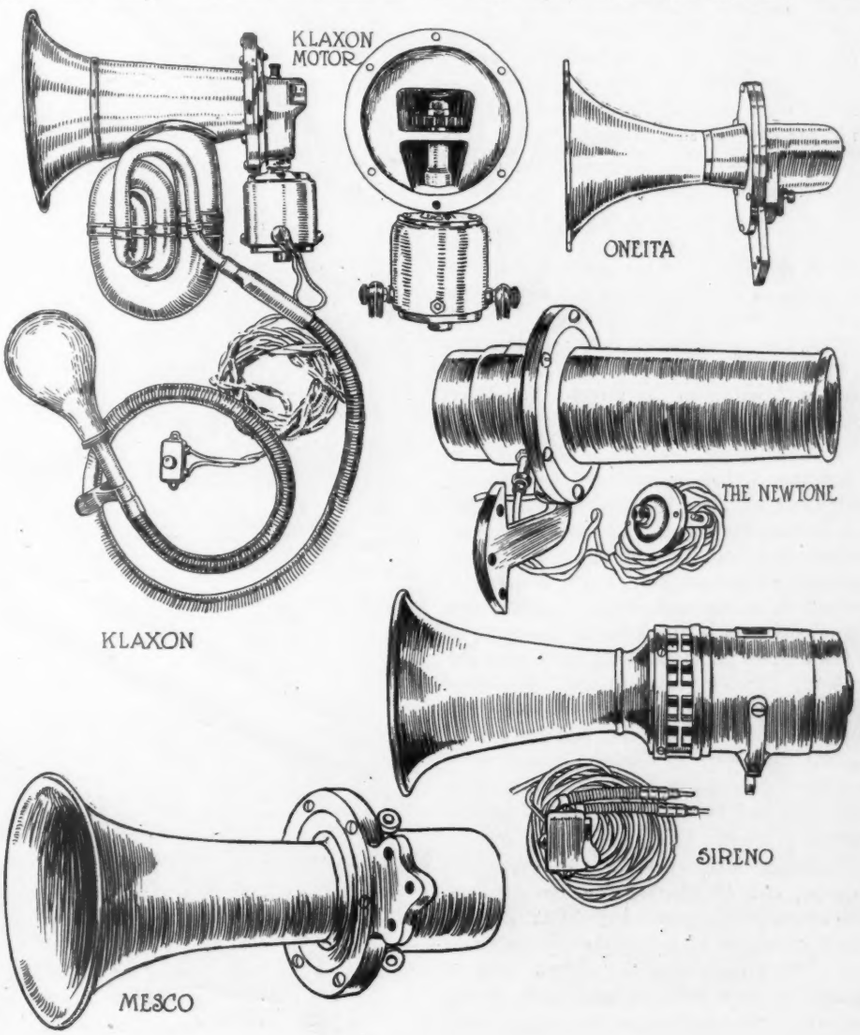
Blue Ribbon—No departure from the conventional is found in the Blue Ribbon, an exhaust chime, its makers claiming that their efforts have been put forth in the way of workmanship and material. It is operated in the usual manner by means of a foot pedal which connects with the chime, which is fastened in the exhaust pipe.

Jericho—Another one of the exhaust chimes group is the Jericho, which enters the 1912 season unchanged. It is attached in the rear of the muffler, either by clamping to the outlet pipe by a clamp coupling or being held by a threaded coupling screwed into the muffler itself. It is operated by a foot pedal and the exhaust passes through the open horn throat when the horn is not in use, the idea being to keep the latter clear of soot or carbon. The Jericho is made of aluminum, and in its largest size, 11 by 5 inches, weighs approximately 3 pounds, inclusive of the attaching coupling.

Waymaker—The Waymaker is something new in exhaust horns, giving a warning without offense. It is operated by a balance valve, controlled by either hand, foot or electric power, and is so designed that when not in action deposits from the gases cannot get into the tubes, it is claimed. Hand control of the horn is from the steering wheel, which leaves the operator's feet free to handle the pedals.

Fowler—A change in the Fowler exhaust signal is the use of a steel stamping in place of castings in the revolving fan. The device is operated by the exhaust gas, which is taken from the exhaust pipe at any place between the cylinder and muffler, A two-way butterfly valve is attached to the exhaust pipe and is operated by a foot pedal and cable. There are a number of flare fan plates set at an angle of 45 degrees and attached to the revolving disk at the far or exhaust side and when the exhaust gas passes through the first set of permanent port holes and then through the port holes in the free disk plate it strikes against the flare fan plate and causes it to revolve, thus producing the noise desired.

Klaxon—The Klaxon, the Combination Klaxon and the Klaxonet are in the same line. The Klaxon idea is a series of violent and rapid vibrations of a tough chrome vanadium steel disk, which is vibrated by a hardened toothed wheel or rotor striking against a glass-hard button riveted in the center of the diaphragm. The rotor is keyed on the shaft of a small electric motor and current is supplied by eight dry cells or a 6 to 8-volt battery. The diaphragm is 5½ inches in diameter and the motor has a laminated seven-coil armature and commutator. The brush holders are arranged to take up automatically the wear of the brushes and the latter are of copper gauze filled with non-fluid oil and self-lubricating. The combination Klaxon includes the regular Klaxon and a reed horn, while the Klaxonet is a



smaller edition of the big fellow and intended for use on small cars.

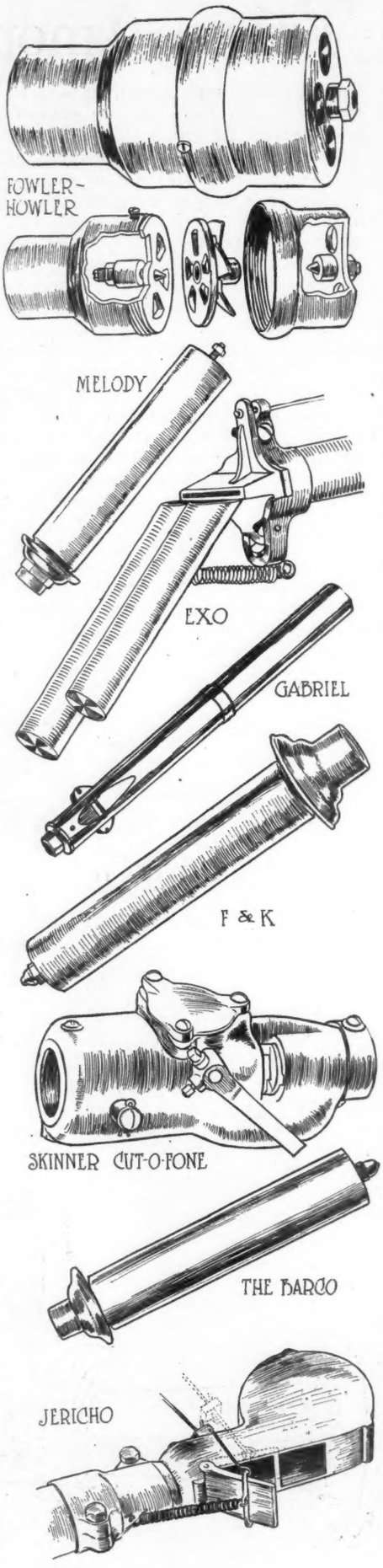
Tuto—Only one change has been made in the Tuto—the fitting of a long bell and projector which is intended to produce more sound and carry further. The Tuto principle is an electrically-driven hammer. The operation of the electrical magnets produce hammer-driven blows upon a projection which imparts these impulses to the diaphragm, thereby producing the sound sent forward through the projector. The Tuto produces two distinct signals, one a low one for regular service and the other a loud long-range warning, depending upon the pressure on the button, which is located on the steering wheel. A new design is the Tutoette, which can be attached in any one of six different places except that the button is not placed on the steering wheel, the Tutoette being listed at a lower price tha the Tuto.

Mesco—The Mesco electric horn now is furnished with a long or a short projector, the latter being 7 inches over all with a 4¾-inch bell, while the former is 11½ inches over all and with the bell 6¼ inches in diametr. The Mesco horn is of the electro-magnetic type, using four coils in the mechanism. While the horn usually is finished i ı brass, it can be had in oxidized copper, brush brass, nickel plate, gun metal or a combination. Adjustments can be made with a screwdriver, and a feature is that the binding posts are so firmly fixed near the bracket that they will not jar loose or turn when pliers are used.

Eveready—In the Eveready the sound-producing mechanism is driven by a powerful electric motor. The switch which operates the horn is mounted on the steering pillar, and has a wiping contact which insures clean contact points. A feature for 1912 is a lever which operates the switch which may be removed so the meddlesome small boy can amuse himself while the car is standing on the street. The Eveready is a new horn which is making its bow at the show.

Clymax—The feature of the Clymax, which is an electric horn, is that it has three points contact on its diaphragm which are 120 degrees apart, all points centering on the middle of the diaphragm, which, it is claimed, makes it impossible to buckle the diaphragm as the pull of each contact point readjusts the pull on the others. The Clymax hammer has four points that come in contact with the three points on the diaphragm, making twelve points that come in contact in each revolution of the motor shaft. Each blow of the hammer is regulated by a tension spring.

Typhoon—There are three different Typhoons, two of which are constructed on the electro-magnet idea and the third actuated by means of a miniature rotary motor. The projector of the style C horn is brazed on to a heavy drawn brass casing housing a steel diaphragm, the casing being



attached to a heavy brass bracket, which is interchangeable so it can be attached to either side of the car. To one end of the casing is attached the motor, which is housed in an aluminum weatherproof case.

Newtone—This electric horn is styled the Newtone Torpedo, largely because of its shape and possibly of the noise which it is capable of emitting. Its principle consists of a rust-proof diaphragm which is actuated by a miniature electric railway motor.

Sireno—No additions have been made to the Sireno line for 1912, there being three styles for motor car use, graded according to size. An electric horn and with the current supplied by the storage battery, the Sireno itself can be operated from a 6-volt battery and from an 8-volt if unusual noise is required. The Sireno Junior is for those owners who operate medium-priced cars, and the Sireno Midget is a pocket edition which can be held in the hand.

Oneita—On the Oneita the vibrator is placed between the magnets and the diaphragm instead of at the rear of the magnets, which does away with the sliding plunger. The vibrator for 1912 has been changed so as to do away with the small vibrator spring. The push button that operates this horn may be placed either on the steering wheel or in the floor, where it can be worked by the foot. The maker of the Oneita also is bringing out a combination model which combines the electric horn with a bulb horn.

Long—The Piel Long horn is operated on the electric principle but differs from the ordinary in that the push button that controls the noise-producing is part of the horn itself instead of being the ordinary push button. As may be seen by the illustration, the button is a large one and on a part of the horn that is easily reached.

Samson—Another one of the electrical type and made with either long or short projectors, the horn itself being made of heavy cast brass and the projector of spun brass. It is of the vibrating buzzer type, the feature being a Mansbridge condensor which is mounted across the contacts to absorb the heavy spark and in this manner prolong the life of the contacts, it being contended that a heavy spark causes deterioration in those parts.

Sonora—It is claimed for the Sonora that it uses the smallest motor of any electrical horn on the market; that it requires only 2¾ amperes to run it. The Sonora uses no disk or diaphragm of the conventional sort; instead, an interposed member of flat spring is struck an inch away from the disk or diaphragm, this spring member beating against the diaphragm or disk like a hammer, delivering 30,000 beats to the minute, it is claimed. The idea of this is to eradicate a rasping or metallic shriek and produce a smooth note.

Review of the Speed-Indicator Field

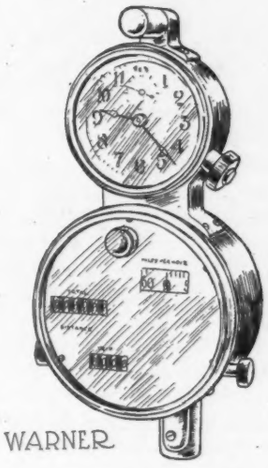
Trend Shows Few Radical Changes — Three Divisions, Centrifugal, Magnetic and Liquid—Aim is To Produce a Steady Pointer—Demand is for Finish Other Than Brass-Nickel and Black are Added

THE trend in speedometers has not taken any decided change in the last 12 months. Nothing radical has been attempted and it would seem as if the makers of these instruments have devoted most of their time to refinements rather than to innovations. The speedometer army still is divided into several classes, with the centrifugal still leading in point of numbers. In this section are such makes as the Stewart, Jones, Standard, Forse, Star and Hoffecker, while in the magnetic division one finds such strong supporters as Warner, the Electric and the American Metric. This last named is a convert during the past season, for in previous years this speedometer, formerly known as the Ever Ready, depended upon the centrifugal principle.

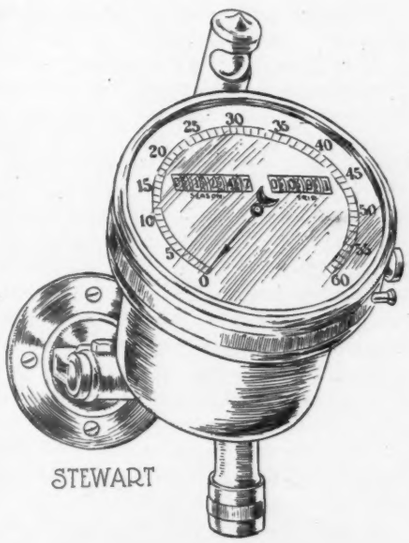
Then there is the division in which are represented those instruments which depend upon liquid for the energy-producer and in which section are such instruments as the Veeder and Casgrain. Then there is another class in which are found the Cleveland and Stover-Lang, which are a combination of a sort of a mechanical amanuensis which keeps track not only of the mileage but the time taken to cover a certain district. The Jones recorder is something on this order and produces a report at the end of the day which is full of information valuable to the owner who wishes to keep tab on the movements of his drivers.

Most of these instruments use the flexible shaft as a means of connecting up the front wheel with the instruments, but in this flexible shaft there is a diversity of ideas. Some use a chain inside the shaft, while others rely on cable made of piano wires.

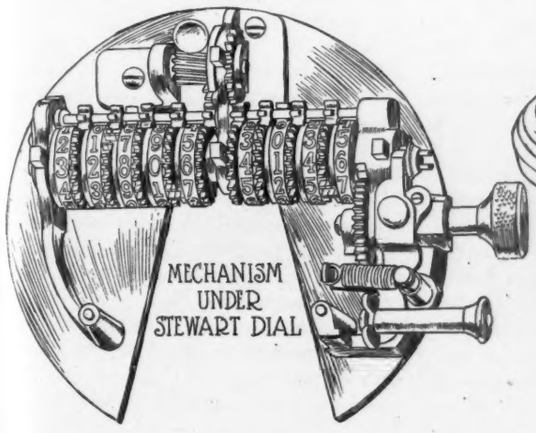
The chief thought with the makers seems to have been to produce a pointer or hand on the dial of the speedometer which will not waver and fluctuate when the car is traveling fast or running over rough roads. They find that the public demands a pointer that will stand as firm as the rock of Gibraltar, no matter what are the conditions.



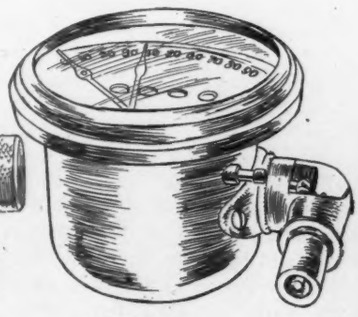
WARNER



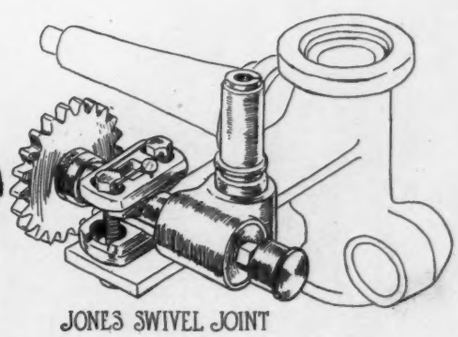
STEWART



MECHANISM UNDER STEWART DIAL



JONES



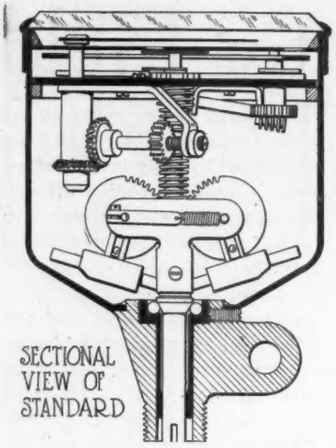
JONES SWIVEL JOINT

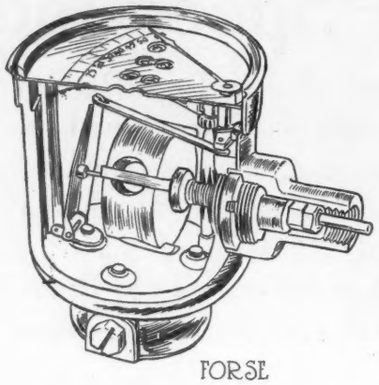
In the way of finish it develops that the buying public is calling for something other than brass, which only is in keeping with the trend in lamps and other fittings. Now we have speedometers which not only are finished in brass, but which also come in plain black or nickel-plated.

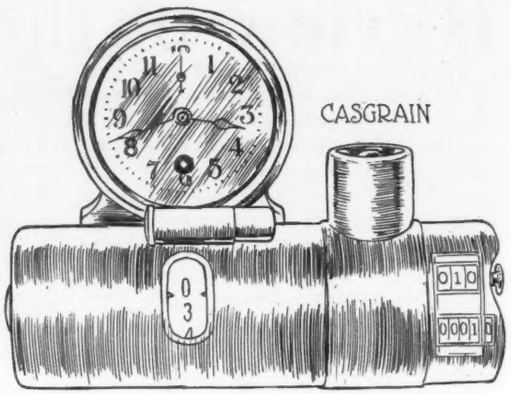
Then, too, the speedometer makers are recognizing the commercial field and are catering to it. One finds a useful idea in a 30-mile instrument with a maximum hand which is a tell-tale in that this hand is locked so the driver cannot set it back to zero. This mechanical detective enables the employer to tell at the end of the day if the employe has been driving too fast.

In the commercial realm the speed-recording devices are going to cut an important figure, not so much that they enable the driver to note this pace but as affording a check on his movement which will enable his employer to intelligently handle the truck proposition. Of course it is not as necessary for a truck driver to know his speed as it is for the pilot of a pleasure car; therefore in furnishing an instrument for the power wagon it is advisable to have a device which will not only show the speed, but make a record of it. This has brought about the introduction of such instruments as the Jones recorder and the Recometer, in which is set down in black and white the speeds of the day, the stops made, the time the car takes going from one place to another —in fact, it is a day ledger which will prove a most effectual check upon a driver who is inclined to loaf or to ignore instructions as to pace.

Another refinement that will interest the tourist is the reset on the odometer which enables the traveler, after he has made a detour or overshot a corner, to set the instrument back to that point where it is in accord with the route book whose instructions he is following. Often a tourist desires to visit some point of interest off the route he is following. When he does so he is handicapped in picking up the old route to have to either

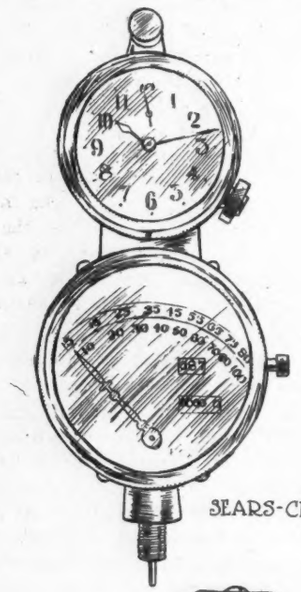

SECTIONAL VIEW OF STANDARD

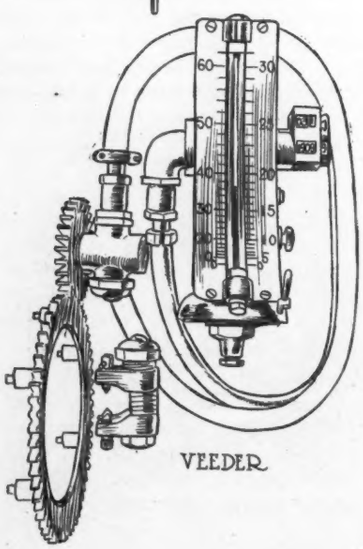

FORSE



subtract or add to his mileage at every point where he tries to check speedometer against route book. With the reset attachment all this is done away with.

In the following will be found a brief description of some of the American-made speedometers which will be seen at the shows. The mechanical features of each are given and when changes in construction have been made they have been noted.


SEARS-CROSS


VEEDER

From this it will be observed that in most cases the makers seem to have struck a standard to which they have adhered and the changes have been mostly in the way of refinements.

Stewart—There has been a remodeling of the Stewart for 1912, although there is no departure from principle. There is a new odometer with direct drive and stop movement, the figures being celluloid cylinders fastened to bronze gears, there being no springs used in its makeup. Instead of separate openings for each figure, there will be one large opening for the season mileage and one opening for the trip, the former registering 100,000 miles and the latter 100 and so constructed that it can be set to any tenth of a mile. The indicating disk is made of an alloy metal instead of aluminum, while another feature is a regulator which permits of the instrument being regulated. The shaft carrying the pointer now has a shoulder at the upper end, the upper jewel bearing setting down against this shoulder to hold the pointer and prevent vibration. The new flexible shaft is made of three-quarter round spring wire, a flat wire making the inner wall of the shaft. This core is covered with triangular-shaped brass wire which is forced into the interstices of the inner wall, giving a flat outside to the shaft. The chain is retained. The drop forged swivel joint in place of a cast joint also is something new, while the new type of steering-arm clamp permits of the swivel joint always being in a horizontal position.

Warner—One of those whose makers believe in the magnetic principle, the Warner, comes out for 1912 practically unchanged, the only change being the application of a trip reset on its bezel type instrument, a departure that will be appreciated by tourists who follow route information. The button at the left side of these instruments resets the entire trip scale to zero with one turn. The button at the right acts on the miles and tenths only and by using the two in conjunction it is possible to turn up any desired mileage on the trip scale, thus making it possible to take up route information at any desired point and follow it through to its conclusion, with the indicator corresponding with every direction of the guide. Heretofore, if it has been desired to digress for a few miles through the parks of some city en route, or to take in some point of interest, it has been necessary when picking up the route again to subtract the mileage of these side trips from the trip indication in order to make the instrument correspond with the route book at each direction.

Forse—The most radical change made in the Forse speedometer for 1912 has been the moving of the shaft opening from the middle of the instrument to the corner, thus eliminating at least one sharp curve. The Forse is another of the centrifugal type, with such features as four-point suspension and radial raceway and double ball bearings for the vertical shaft. An evenly spaced dial is secured by means of the parabolic curve of the yoke arms which do not require the use of compensating cams. A study of the device shows that the lower end of the vertical shaft is connected to the flexible driving shaft and as the vertical shaft revolves the four polished steel balls in the raceways of the carrier roll outward through the action of centrifugal force. The rolling contact with the arms of the yoke results in its rise and fall as the speed increases or decreases. No springs are required for steadying the indicating hand. The flexible drive shaft used on the Forse is made of twelve strands of music wire wound into a cable which is incased in a steel-lined brass housing. It is reinforced at the driving ends.

Jones—The Jones belongs in the centrifugal family and for 1912 the pleasure car instruments show no mechanical change. All that has been done is to improve the finish and give the buying public an option on brass, nickel or black. Brass always has been the standard, of course, and a year ago nickel started coming in, but 1912 sees the introduction of the black finish. The speedometer designed for truck service has been changed a bit by providing extra heavy fittings. There are two models in this line, both fitted with 30-mile heads, but on one there is a maximum hand which is locked so that

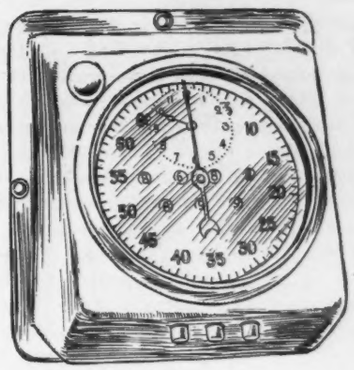
it is possible for the employer to discover whether or not the driver has been obeying instructions as to pace. The other instrument comes without these devices. Then there is the Jones hub odometer, which is complete with a self-containing special hub cap, 1 inch longer than the ordinary kind. Still another deviation is the Jones recorder, which is best described as a time clock, giving time, speed and distance. It tells when the vehicle is in motion, when it stops, how long it stops, how far it runs and at what speed. The entire record is printed on a chart which is removable after each day's run.

Veeder—Besides odometers the Veeder line includes a tachodometer, which besides showing mileage, also is a speed indicator, operated by means of a flexible shaft. It can be put in what might be called the liquid-centrifugal class, the liquid being set in motion by a paddle which runs at a speed corresponding to the speed of the car. The shaft of the paddle wheel stands almost vertical in the body of the instrument. The paddle wheel is at the lower end, while the upper end, which is considerably above the liquid level, carries a bevel gear in mesh with a corresponding gear on the main driving shaft. Ball bearings are provided for both ends of the shaft.

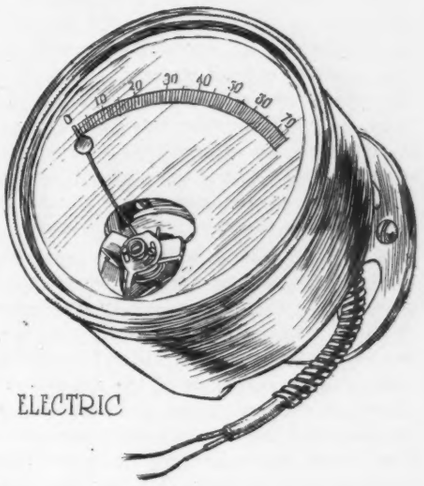
Sears-Cross—Accuracy has been the aim with the Sears-Cross people, who pin their faith to the centrifugal principle, and the steady pointer has been the goal. A feature which tends to bring this about is a double governor in which one governor carries the speed up to 15 or 18 miles an hour, when it becomes a sort of flywheel to hold the needle steady while its mate picks up the running in the other department. Another point which marks a departure over last year is a change in the matter of assembly. Before the instrument was built inside the case; now it and the case each is a separate unit. The case is a case and the instrument is assembled by itself, rigidity being secured by means of an aluminum casting which is held together by a web. Instead of brass for the gears, flanges and sleeve phosphor bronze is used, running against a hardened steel stud. Calibration is secured from a rocker arm instead of a cam which is an insurance against wear. A feature is that the pointer follows the speed of the car; that if there is a slackening of pace the needle goes back to that particular speed at once instead of gradually. The flexible shaft is a single-wind no core wire which is inclosed in an Almond casing, new with this company this year, which is made of steel wound with brass. There are four sets of ball bearings in the wheel attachment, while in the driving shaft proper, where it connects the flexible shaft with the instrument, there are two sets of ball bearings. There also is a reset on the odometer which permits the driver to turn back to any mileage he desires, a feature which is carried over from last year.

Casgrain—To explain the principle of the Casgrain speedometer one finds the inventor of the device tells it simply in this way: When he first undertook to get up something different he conceived his idea while watching tea leaves move around in a cup when he stirred the tea with a spoon. In his speedometer the tea cup represents the cylindrical outer casing of the speedometer, the tea the mineral oil used as an energy-conveyor and the tea leaves the figure scale on the speedometer. The outer casing of the instrument is of heavy brass and cylindrical in shape. Inside this brass shell the dial, its operating mechanism and the liquid operating medium all are contained in a sealed glass cylinder. Motion is conveyed to the liquid by means of four steel paddles which are rotated by the driving mechanism. The amount of the liquid is a fixed quantity and the size of the confining cylinders always the same, which prevent wear or alteration in the size of the rotated paddles. There is no mechanical connection between the driving mechanism and the dial and road shocks and engine vibrations are absorbed by the liquid.

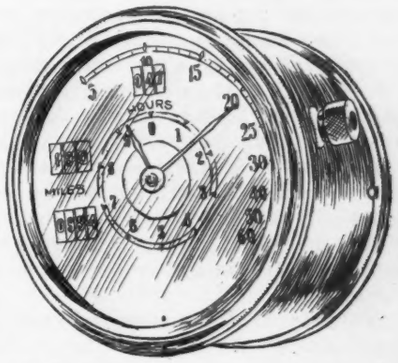
Standard—A Standard De Luxe model is a new one for 1912 with the Standard people, whose instruments are operated on the centrifugal principle. The De Luxe model is made only in the 4-inch size, with



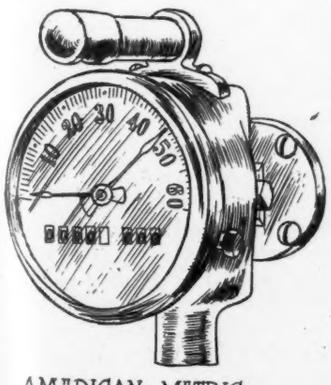
STOVER-LANG



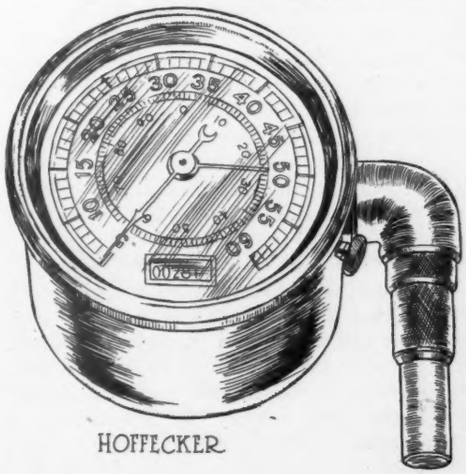
ELECTRIC



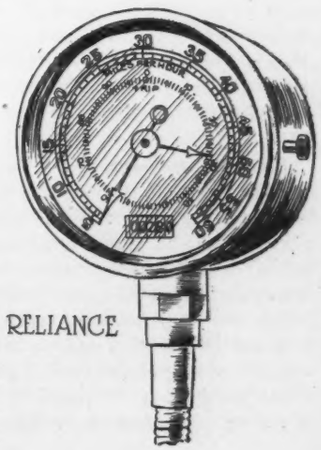
CLEVELAND



AMERICAN METRIC



HOFFECKER



RELIANCE

and without clock, but in each case equipped with electric light attachment. The pointer is in the center of the dial and moves through three-fourths of a circle. In addition there are two other new models, one carrying a 24-hour watch and the other a clock. The centrifugal governor used in these instruments is original in that it revolves on ball bearings and is driven by a flexible shaft from the front wheel. As the speed increases the two opposing weights on the governor slide out upon rods which support them. Two segment gears which are operated by the weight, mesh with a circular rack which slides vertically upon a spindle and transmits the motion to the pointer on the dial. The movement of the governor weights is balanced by the spring, one end of which is attached to the segment gear staff and the other to a lever which is attached to the end of the staff on the opposing segment gear. This spring arrangement, combined with the arrangement of the governor weights, moves the circular rack up and down on the spindle at a rate in proportion to the speed of the governor.

American Metric — Changing systems, the American Eveready Co. also changed names and the former Eveready speedometer now is known as the American Metric, which comes in twelve different models. Heretofore a supporter of the centrifugal theory, the company has switched to the magnetic, abandoning all its old models. The dozen new ones vary in price and miles-per-hour capacity, but in the main the essential features are the same. The capacity of the instruments range from 50 to 80 miles per hour, according to size and price. Besides the change in principle, the company also has altered other things, one of which is the abandonment of the gooseneck and the substitution of the swivel joint at the steering arm. Another departure is the improvement of the flexible shaft, which for 1912 has been improved in flexibility to such an extent that it is claimed that it is possible to coil the shaft into a 6-inch coil without breaking it.

Hoffecker—Besides refining and improving its product, the Hoffecker company has brought out two new models for 1912, one of which is model D, which has a 100,000-mile odometer which also has a daily trip device with a tenth attachment that can be reset to zero. The model H combination is of the vertical type which has been brought out for use on medium-priced cars.

Electric Speedometer — The Electric Speedometer Co.'s product is different from the general run in that its two parts consist of a direct-current generator geared to the wheel of the vehicle and a voltmeter connected to the generator. The latter has a permanent magnet for the field excitation, the current being generated in a six-pole armature rotating between the poles of the permanent magneto. A six-segment commutator which uses 22-karat gold brushes, enables the current to be collected from the armature by 14-karat gold brushes to eliminate oxidation. The parts of the instrument consist of a tungsten steel magneto, an armature, a gold commutator and brushes. The voltmeter apparatus consists of a permanent tungsten steel magnet carrying pole pieces between which the moving element turns, the moving section being mounted on sapphire bearings. An indicator moves upon a scale which is calibrated in miles per hour. By having a revolution counter on the magneto gearing, it is possible to keep a record of the miles traveled in a given period of time. A novelty is an electrodometer which hangs on the robe rail which is for the information of the passengers in the tonneau, who can note the mileage. The device resembles a watch and is operated electrically from a contactor in the magneto which closes the circuit, thus exciting a small magnet with battery current, which magnet attracts the armature, thus pulling down the next figure.

Cleveland—In principle the Cleveland differs from many others, which has led its makers to term it a continuous automatic stop watch. The indicating needle does not follow the speed of the car in that it moves with every increase or decrease in the pace, but changes every 1/30 mile or every 176 feet, the time consumed in traveling this distance being taken by means of the escapement principle of a clock, indicating on the face of the dial the average speed for this distance in terms miles per hour. The hand making this record does not move until the distance has been actually traveled and consequently gives a distinct reading similar to that obtained from the hand of an electric clock when it moves from one minute to the next. Two odometers are employed, trip and season, while the indicator is operated by means of a flexible shaft, which is driven by the front wheel and automatically winds the clockwork of the indicator every 176 feet, or 168 times to the mile. Therefore, this instrument does seven things: Gives the average speed for every 1/30 mile; trip miles, actual running hours for the trip; average speed for trip or day; complete season mileage; actual running hours for the entire season and average speed for the season.

Reliance—In the way of features on the Reliance there is the ball-bearing shaft connection which consists of a flexible shaft suspended on ball bearings, designed to eliminate shaft breakages, jumping speed indicators, etc. The flexible shaft is provided with a swivel union at each end, giving it freedom from strain. In the way of an attaching bracket this company has a universal device which, it is claimed, can be adjusted to any steering arm so the driving pinion is in the same plane as the ring gear on the car wheel.

Troy—In putting the Troy speedometer on the market its makers have studied simplicity and the new model shows the elimination of the flexible shaft and an aim to bring out a small and compact instrument. In the Troy the energy is conveyed from the generator to the indicating mechanism by a column of air instead of direct drive. As the hand is impelled by the pneumatic force, which gives it a cushion upon which to rest, oscillation, it is claimed, ih done away with.

Stover-Lang—In appearance the Stover-Lang resembles a clock set in a square case, but this represents the company's theory that the correct method of registering rate is: Rate = distance ÷ time. A clock escapement is used which is automatically wound so that at the end of every 5 seconds the count of the wheel revolutions is completed, which then is recorded. The connection used is a rubber tube through which air is forced in puffs every half revolution of the car wheel by a diaphragm. The construction of the instrument, which is a combination clock, pace-recorder and mileage register, does away with springs, cams, magnets, etc.

Star—The Star is of the centrifugal type in which important features are a balance wheel and governor for the purpose of securing accuracy and steadiness of the hand. As the governor balls spread with the increase of speed the lifting power being equal to that of the pulling power, insures a steady pointer which is claimed to defy rough roads. By means of an opposing spring which is ground to a graduated taper, an evenly graduated dial is had without the use of a cam.

Late Racing News

SHEEPSHEAD BAY SPEEDWAY?

New York, Jan. 7—Now it is asserted that the old Sheepshead Bay horse racing plant is to be transformed into a motordrome and there really seems to be something to it. The talk is a 2-mile track. In addition there are to be provisions made for other sports such as polo, golf and tennis. The property consists of 430 acres and the place is within 40 minutes of New York city.

CASE IN 500-MILE RACE

New York, Jan. 8—Visitors from Indianapolis at the show today announced that two more entries for the 500-mile speedway race have been received, two Case nominations having been filed, one of which will be driven by Disbrow. This makes six to date, the others being two Stutz cars, a Fiat and a Mercedes.

NIKRENT WINS A RACE

San Diego, Cal., Jan. 7—Louis Nikrent, driving a Reo, today won a 50-mile race over the 2-mile dirt track at Lakeside, covering the distance in 46 minutes 12⅘ seconds, defeating his only competitor, Shain in a Schacht, by a considerable margin.

Demountable and Detachable Rims

As Noted in Garden Show, No Startling Changes Have Been Made—Refinements of Tried Constructions Rather Than New Designs Are Features—Simplicity Aimed at and Secured—Three Types on Market

REFINEMENTS of tried constructions rather than new designs seem to be the features of the demountable and detachable rim field this year. The three new types of demountables on the market have been undergoing tests for many months, and one of them was brought out just after show time last year. The tendency noted last season toward simplicity of rims is more in evidence at the garden this time. The inconvenience caused by lost bolts and wedges have resulted in the demand for fewer parts, and makers are producing rims in which few nuts need be loosened and still fewer in which they must be taken off. This means speed and simplicity, but at the same time the need for staying power has not been neglected. The only really radical change is in the application of the demountable principle to wire wheels, which presages a new design of wheel in American practice.

Rims of the demountable type may be logically divided into four main classes, with the method of fastening the rim on the felloe as a basis. The greater part of them are what may be called the bolted type. In rims of this class a series of from four to eight bolts passes transversely through the felloe and engage either radial lugs on the rim, separate clamps or a continuous wedge ring which bears upon the rim and holds it in place. A second type is the split-rim class, in which the rim is cut crosswise at one point. It is removed from the wheel by allowing the rim to spring apart. A third type is that of the expanding ring, and depends for its action upon the spreading of segments of a ring placed between the felloe and the rim. The fourth type is that in which wedge-shaped pieces of metal are permanently fastened to the rim and others to the felloe band, the only other necessity being some method of drawing the ring around so that the wedges act upon each other and thus tighten the rim to hold it in place.

The rims may or may not be quick-detachable, but usually the detachable feature is supplied. Detachable demountables in general are divided into two classes, one class consisting of rims which permit the operation of the detachable feature without demounting, and the second being made up of those which must be taken from the wheel before detachment of tire can be effected.

Standard Universal Demountables—The rims handled both by the Standard Welding Co. and the United Rim Co. are all of the bolted type, but are of three different styles. The feature of the Standard Universal line for this year is designated as Type No. 1. In this style, there are six locking clamps, each secured by a bolt which passes through the felloe. The method of attachment is illustrated in Fig. 1. It will be seen that a back nut B1 and a washer W1 on the inner edge of the felloe band B engage the latter to give it lateral support. A collar C on the outer extension of the bolt B serves the double purpose of holding the front washer W against the face of the felloe and of supplying a jam seat for the bushing end of the clamp nut.

The front washer, which fits over a square shank on the bolt, has an outward extending lug L which acts as a stop and prevents the clamp from being overturned in either direction. The top of the washer is cut off square to receive a square shoulder on the clamp and a bushing nut is threaded to the clamp on the outside and the bolt on the inside. In locking the rim to the wheel the mere turning effort of the socket wrench carries the clamp upward to its locking position, and in unlocking, two turns of the wrench will loosen it sufficiently to allow the clamp to turn on the collar into a position out of the way of the rim. In tightening the squared portions of the clamp and washer overlap and the clamp nut jams on the bolt collar. When locked, no part of the rim extends beyond the outer edge of the rim, and thereby is protected from injury. Bolts, clamps, nuts and washers remain on the rim at all times and cannot become lost. By reversing the rings R1 and R2, the rim may be made to take straight-side tires instead of clincher, thus making it universal.

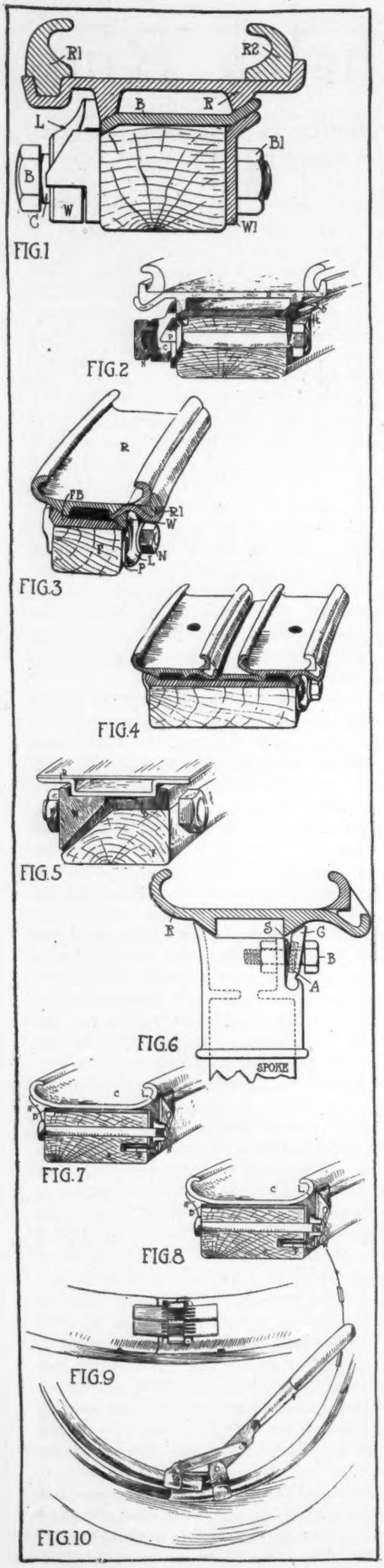
Type No. 2 rim is identical with the Standard universal quick-detachable demountable described above, with the exception of the rim base and the locking device. This, like the other, is provided with clamps which automatically turn out of the way of the rim when the nut has been loosened. The rim, Fig. 2, consists of a continuous wedge ring the inner side of which presses upon a flat band on the felloe, which has a wedge-shaped extension to fit the wedge ring. This band is beveled at its outer edge, and upon it rests the bottom of a U-shaped channel rim. The edge of the clamp extends above the felloe and when tightened wedges the rim against the inner edge of the band. The nut is fitted with a collar having an inside thread to correspond with the bolt. The operation is the same as that of the previously described type. Type No. 3 demountable is of the older style, in which the nuts and wedge clamps must be removed entirely to permit demounting.

Firestone—The Firestone quick detachable demountable is practically the same this year as last, so far as the demountable feature is concerned. The clincher side ring R1, Fig. 3, of the detachable portion has been altered slightly by the use of only one pin, P, in the lock, instead of two as in previous practice. The rim is of the through-bolt type in which, by loosening a nut N the slotted lug L is allowed to slip downward from its seat on a plate P, releasing a wedge ring W. This permits the rim R to be slid off. Last year a feature of the Firestone exhibit was a dual demountable tire for pneumatic or solid tires. This demountable for dual tires has been improved to permit both tires of a set to be removed towards the outside instead of one each way. It is illustrated in Fig. 4.

Fisk — Fisk demountables show no changes from the type which appeared for the first time 1 year ago. This rim, made for the mechanically-attached tire, has the felloe beveled off through half its width at an angle of about 45 degrees. Upon this felloe fits a band of the same shape and carrying a shoulder upon the side opposite to the bevel. This is held in place by bolts passing through the felloe band and, lastly, through a continuous wedge ring which has a similar shoulder. The wedge ring is thus forced up the beveled side and the shoulders grasp a U-shaped channel ring to which the tire is fastened, as illustrated in Fig. 5. The Fisk demountable, which appeared last year in dual form, is retained.

Gibson—In connection with the exhibit of Newmastic tire filler at the garden there are shown two rims with which tires filled with this composition, as well as those filled with air, may be used. One of these, the Gibson, is a demountable in which both felloe and felloe band have been dispensed with. On the end of each spoke there is a steel clamp which engages the rim. The outside clip of the clamp has a recess A, Fig. 6, in which a spiral spring is wound around a studbolt B. The bolt passes through a clip G, whose upper end serves to clamp the rim R into place. When the bolt is loosened the pressure of the spring forces the clip outward, releasing the rim. The other rim in this exhibit is the Parker detachable.

Baker—The Baker bolted on demountables properly belong in the class of bolted rims, although they have the split-rim feature. The latter, however, is merely for



quick tire detachment, the method of attachment to the wheel being entirely by bolts. This also involves the use of a wedge clamp, which turns automatically out of the way when the nut is loosened a few turns. This is accomplished by the use of a bolt upon which a collar is pressed. This holds the wedge against the bolt head, but loosely enough so that the brace wrench turns it around when the bolt is loosened. The wedge has a lug, which holds the rim in place. As mentioned, the rim is split and is held in place by a stud plate carrying four dowel pins, which pass through holes in the rim and into depressions in the felloe.

Dorian—Like the Baker, the Dorian demountable is of the bolted type but has a rim which of itself might place it in another class. In this case the rim proper is of the expanding type to allow of quick tire detachment. There has been no change in the demountable feature of the Dorian rim during the past year. The wedge clamp and nut are kept attached to the felloe in a novel way as illustrated in Fig. 8. The nut W passes partly through the clamp L and has a collar over which fits a cap H. The cap is riveted to the clamp and allows the nut to be turned away by the socket wrench, but keeps it from coming away from the clamp. A pin P is fastened to the lower part of the cap and passes through a plate screwed to the felloe F. It is upset on each end and the clamp and nut are thus kept from falling to the ground.

Fig. 9 illustrates the double-jointed hinge of the new Dorian expanding rim. The rim is split and connected by the hinge, which consists of merely six rods, pin-jointed at either end. In the rim will be noticed the slots intended for insertion of the special tool by which the rim is brought away from the tire. The tool itself and its method of operation is illustrated in Fig. 10. The long lever arm makes tire removal easy. The edge of the rim at the split is chamfered off to release the tire gently. Another new Dorian rim is intended for use on light cars. It is of the expanding type, but has no hinge. The hinge is replaced by a lock consisting of a tongue with a downward extending end which fits into a corresponding recess in the other part of the rim, as shown in Fig. 11. The side of the rim is provided with four holes for the special tool illustrated in Fig. 12.

Detroit—Detroit demountables are shown at the garden by Smalley Daniels. These rims are of the bolted type, but are split for the detaching of the tire. The construction is shown in Fig. 13, the chief feature of which is the design of the lug or wedge clamp L. This is provided with a wedge projection which passes under and holds the rim. It is slotted as shown, so that when the bolt B is loosened, the lug will drop and release the rim. Fig. 14 shows the lock for the split rim. A special tool is supplied to draw the rim together the distance of the cut-out section in case it becomes rusted. The additional plate in the lock fills the gap when in use to prevent the entrance of water.

Empire—Only slight change is noticeable in the Empire demountable and that is in the method of fastening the two halves of the split rim. The demountable locking feature is the same as last year. This rim is one of the kind in which the loosening of the nut on a through-bolt permits the wedging lug to be turned

Figs. 1 and 2—Two types of Standard universal demountables; Fig. 1 shows type 1; Fig. 2 shows type 2, L being the clamp, R the rim, B the felloe band, C the collar on nut N and P the projection on the collar. Fig. 3—Firestone quick detachable clincher demountable rim. Fig. 4—Firestone dual demountable. Fig. 5—Fisk demountable. Fig. 6—Gibson demountable. Fig. 8—Dorian rim, showing way wedge clamp and nut are kept attached to felloe. Fig. 9—Double jointed hinges on new Dorian. Fig. 10—Dorian tool to remove rim from tire

THE MOTORIST'S BOOKMAN

THE title "A Woman's World Tour in a Motor" would appeal to the imagination as something particularly interesting and instructive, but as one reads this volume of 360 pages one is strongly impressed with the exceedingly cursory view of the countries through which the author motored. More, perhaps, could not be expected in one small volume. The author, Mrs. Harriet White Fisher, was accompanied on this tour by her maid, a chauffeur and a chef. Sailing from New York to Paris the party motored from Paris to Marseilles, where they embarked for Egypt. From Cairo, the next objective point was Bombay, crossing India via Delhi, and Benares to Calcutta, thence by boat to Colombo on the Island of Ceylon. "Travelling in Ceylon," the author says, "is for the most part comparatively easy either by railway or, preferably by motor car. The roads in most places are excellent and the rest houses are far more comfortable than the corresponding institutions in India. The motor car is now being quite commonly used. To hire a car costs about $50 a day for car and driver."

Leaving Colombo the party enbarked to Shanghai, then came Japan, and lastly Honolulu, from which point the motorists sailed for America.

It is to be regretted that the author, an American, in her brief mention of her own country, writes in such disparaging terms of a portion of the west, through which she passed, referring to it as "Rough Roads and Tough Hotels." To Denver she pays the compliment of having some fine homes and magnificent roads; the river-to-river road is simply mentioned as having excellent roads with good guideposts; and Chicago she dismisses with

out of the way. It is illustrated in Fig. 15. The nut N is provided with a collar A upon which rides the wedge clamp or lug L. L-shaped stirrups R are riveted to the felloe band B and the lugs rest in these when in place. The new connection of the split rim is shown in Fig. 16. The Z-shaped split is locked by the plate screwed on the inner side of the rim and the halves held in place by four dowel pins.

Booth—The Booth demountable rim for wire wheels is illustrated in Fig. 17. In effect, the rim is the same as that for wooden wheels except that it is drilled for the insertion of the wire spokes. The rim for the ordinary wheel is, in its demountable features, the same as last year's product. It is the single representative of the true expanding-ring type of demountable. The expanding and locking device is placed in the felloe band and three or more of them are employed on a rim. Fig. 18 shows the construction of one of the locks. Two toothed wheels G and G mesh with the worm gear E, which is turned by a socket wrench. The teeth on each wheel are cut away about one quarter of the circumference, forming two shoulders on each, which engage on lugs on the rim so that when the rim is pushed in place on the felloe, turning the worm rotates the wheels so that they engage in these lugs and bind the rim in place. The locking device for the detachable feature of the split rim consists of a taper pin, which draws the edges of the rim into contact and into alignment vertically. The inner edges of the channel rim, bearing against the large end of the pin, are held in place by the latter.

Lambert—Wire wheels with demountable rims are features of the exhibit of the American Rim Co., handling Lambert demountables. In this instance, also, very slight modification is required for application to metal wheels. The simple welding of the single bolt of the locking mechanism to the steel rim in place of running it through the felloe seems to be the only alteration necessary. The change in the Lambert demountable for wood wheels from last year's construction consists in the use of two locking devices instead of one. Better appearance and balance of the wheel seem to be the reason for the change. This rim is an example of the wedge type, the locking portion of which is illustrated in Fig. 19. Permanently riveted to the wheel are a number of wedges and on the side of the rim at points exactly opposite are riveted wedge-shaped plates or pads. At opposite points on the rim two slotted tongues fit into the felloe. A chrome-nickel-steel bolt passes through the slot in the tongue and through the felloe. These tongues or dismounting wedges D with the adjusting wedges on the opposite side with others secured to the felloe band A, form the supporting wedges. In mounting the rim, the cap nut G is turned by means of a brace wrench so as to engage the thread of the bolt H secured to the felloe. This draws the rim on so the wedges on the felloe band and rim slide over each other and gradually lock into place. A feature of this construction is the method of locking the nut G. On the latter is a ratchet wheel R which engages a pawl P under pressure from a spring S. The nut is therefore locked automatically.

Wire wheels with quick detachable features, which have been described above, form a part of the exhibit of the McCue Co.

REVIEW OF RECENT BOOKS

only a mention of the repairs that had to be made on the car because of the bad going, and the banquet tendered her by the Chicago representative of the car she drove. In fact, the compliments to America are very scarce, and the impression therefore is that the author favors the foreign countries and America is simply an incident. Published by J. B. Lippincott Co., Philadelphia.

Some Old Flemish Towns

Attractively bound, artistically illustrated and written in easy narrative style "Some Old Flemish Towns" relates the author's wanderings through the land of Flanders and its quaint and picturesque towns. Although Ghent and Bruges and other well-known cities are visited, it is the towns unfrequented by the tourist—Ypres, Alost, Dixmude, Courtrai, Oudenaarde, and many others that the author describes with many interesting sidelights on the customs and life of the people. "No part of Europe," says the author, "is more deficient in what is known as 'scenery' than this region, a flat well-watered and populous plain lying between the frontier of France and Holland with a coast line on the North Sea of about 50 miles." In its ancient towns, however, he found the people most interesting, and in his free-hand style has given the reader an intimate view of the Flemish people. Skillful with the brush as well as the pen, the author has caught the charm of this land of the Flemings, a land rich in art and history, and the colored and sepia illustrations are particularly noteworthy. To those planning a foreign tour this book has a special significance. George Wharton Edwards. Published by Moffat, Yard & Co. Price, $4.00.

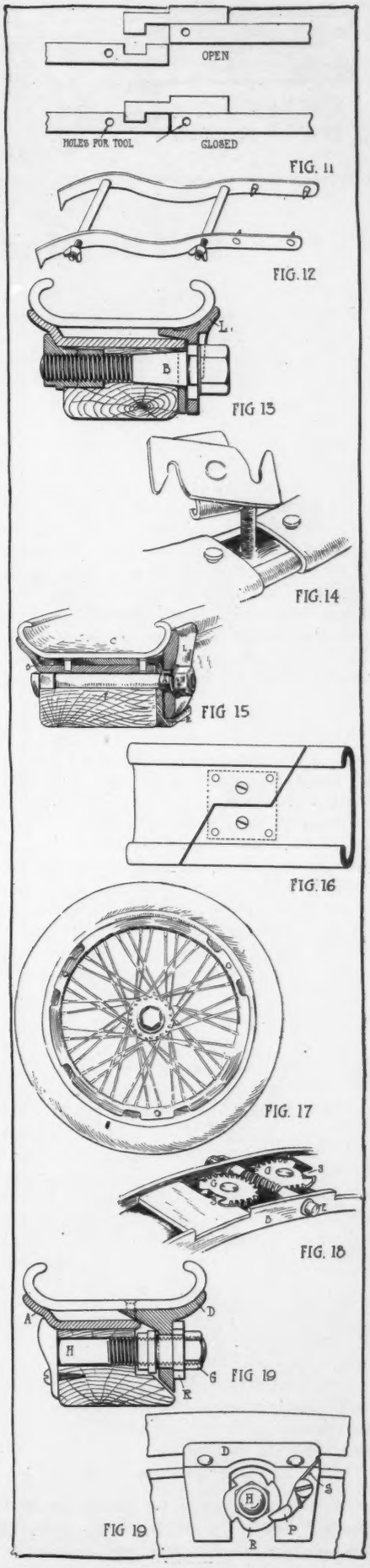


Fig. 11—Hinge used on Dorian rim for light cars. Fig. 12—Dorian tool used in connection with hinge shown in Fig. 11. Figs. 13 and 14—Two views of Detroit demountable. Fig. 15 Illustrating method of locking of the Empire demountable. Fig. 16—New connection used on the Empire. Fig. 17—Booth demountable rim for wide wheels. Fig. 18—Construction of lock on the Booth. Fig. 19—Locking portion of the Lambert demountable

MOTOR AGE
Published Weekly by
THE CLASS JOURNAL COMPANY
910 South Michigan Avenue CHICAGO
NEW YORK OFFICE
239 West 39th Street
SUBSCRIPTION RATES
United States and Mexico
$3.00 per Year
Other Countries including
Canada $5.00
Entered as Second-Class Matter September 19, 1899, at the Postoffice at Chicago, Illinois, under Act of March 3, 1879

The Madison Square Garden Show

SATURDAY night's opening of what is to prove the last motor car exhibition in the now famous Madison Square garden, New York, could not help but impress the spectators with the thought of the vast improvement that has been made during the past 11 years of the century, which years contain the story of the vast strides that have been made in the car industry. Previous to the opening of the century the car was working for recognition and it was with the death of the old century that the strong movement towards the motor vehicle had its inception. During all of the garden shows there has been more or less effort at decoration, the object of making the surroundings adaptable to the industry, but this season it is fitting that, as the last show, the decorations should be of a more or less subdued and retiring nature, thus leaving the car as the major factor in the setting. This is as it should be. There were years when decorations preponderated. Not so with the present exhibition. A glance around the arena satisfies the spectator so far as the setting is concerned and he is left free to satisfy his indulgence in car construction.

THE return of the roadster body type is an interesting factor of the present show. When the roadster type of body had its inception 3 years ago it was found that every exhibitor's booth had it and at that time it appealed more to the eye than to comfort in riding. The rumble seat was then a part and it proved a sad one on account of the lack of comfort for road use. This caused a quite general disappearance of this body type during the following two seasons, and this year there is a pronounced resurrection, but without the rumble. The new roadster body is a comfortable construction. It is built to carry two, and in some cases three passengers. One maker has built the seat wide enough to accommodate three without the slightest discomfort. This is much preferable to the rumble design.

BUT there are many other respects in which the present roadster eclipses the original one: The present one is a comfortable creation. The seats are placed well in front of the back axle. It used to be that the maker when designing a runabout thought it necessary to mount the motor 6 to 8 inches further to the rear than in the touring car and to place the seat above the axle. This conception has been exploded. The motor is now in the same position with relation to the front axle as in touring car models, and the seat is well in advance of the axle, giving a very easy riding vehicle.

BUT the maker has gone still further in the matter of roadster comfort. The cowl dash is used on practically 95 per cent of the types manufactured. The fore-door is also used. The windshield is made standard with several, and the top is a stock equipment on a great many models. In these respects the roadster is as well protected against the weather as the most approved touring car.

IN the matter of design the leaving off of the rumble seat has made it possible to locate a large cylindrical or oval gasoline tank in rear of the seat, and also leaves room for a touring trunk and the spare tires. This frees the running-board of practically all incumbrances, and makes the roadster a most desirable touring vehicle. The practical must always win out, and the 1912 roadster cannot but be considered as a very desirable and practical type of car. While not primarily designed as a show vehicle it nevertheless fills the role satisfactorily in this respect, and it also meets public approval in that it is a more economical vehicle to operate. The reduced weight increases the tire life and the economy of fuel should also make itself apparent.

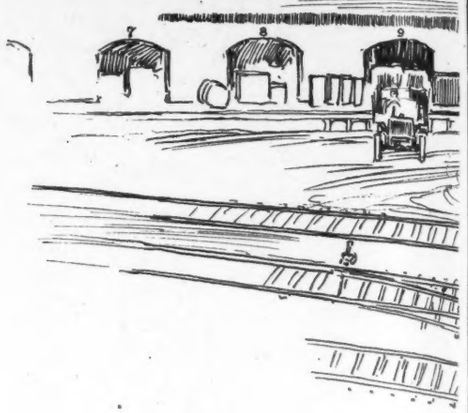
WITH the original runabout the general conception was a speed car, and they were sold largely to a class of people who ran a vehicle faster than the average touring car. The present roadster has not been designed along this line, but along the more rational method of furnishing a two-passenger car for those actually needing such. With the old runabout the tire expense often was greater than with a touring car owing to the higher speed at which it was operated. This is not the case with a great many runabouts today because the gear ratio is such as to make the speed approximately the same as with a four- or five-passenger machine.

ONE year ago when the unit compartment body was exhibited as a show vehicle by a few exhibitors it was expected that a year hence the practical value of this vehicle would be realized, and that many manufacturers would introduce it. This has not been the case. There are only two examples of gasoline chassis with this type of body at the show. Each is a model in its class. The owner-driver is furnished with a comfortable individual seat without any partition between him and the rear seat, making the design ideal for family use where a member of the family drives. There is but one door on each side, and a folding seat beside the owner-driver. It would seem that scores of owners would welcome a body type of this kind, but generally the show vehicles are so sumptuously fixed up that the ordinary man feels that it would be impossible to get a rationally-fitted body of this kind. Undoubtedly if any maker were to regularly list such a body with plain leather upholstery and fittings in keeping with the chassis there would be a very quick demand develop. It is a type of body that is going to increase. It is a type of body ideally suited to the small chassis. It is a type of body that will appeal to a high percentage of buyers and one that will do much to popularize the winter use of the car with that class of owner who does not employ a chauffeur.

ANOTHER body improvement which augurs well for the increased use of the medium-priced car is the introduction of the limousine on touring car chassis which regularly list with touring car bodies under the $2,000 mark. It was only a year or so ago that the limousine was considered suitable only on the high-priced chassis. This conception has been exploded. The medium-priced chassis will be used more in 1912 for limousine purposes than ever before but its use will largely be hampered by the chauffeur problem, and by the coupe and the unit compartment body.

Three Shows at Once Keep Father Knickerbocker Busy

The Commercial Car Division of the Shows



Now Come the Power Wagons

Trucks and Light Deliveries Have Their Innings in the Garden and Palace and also Will Be in the Lime Light Second Week at Chicago with Large Exhibits

NEW YORK, Jan. 8—With the opening of the Grand Central palace show of the National Association of Automobile Manufacturers Wednesday night the business world will get its first opportunity to inspect the 1912 models of the commercial motor vehicles, for the power wagons will divide attention with the pleasure cars at the palace. Following closely on the heels of this will come the second week of the garden show of the Automobile Board of Trade, when the trucks and light deliveries will have the stage all by themselves for a full week. Then there will come a gap until February 5, so far as the commercials are concerned, when the second week of the Chicago show will usher in the power wagon.

Trucks at the Show

A glance at the shows' lists gives one a fair idea of the growth of the commercial vehicle industry in the past year. Whereas, in the garden last year there were thirty-five different makes of trucks and light deliveries, this year there will be twenty-nine. This, however, does not mean a falling off, for the palace show has thirty-two different makes on its list, which makes a total of sixty-one for the two shows. It is evident, though, that Chicago will represent the full strength of the industry, for the Coliseum will house sixty-four different makes, twenty-five of which will not be seen at either of the New York shows; namely, Adams, Avery, Chicago Commercial, Clarke, Commerce, Dorris, Harder, Indiana, Kissel, Lauth-Juergens, Mais, Mercury, Monitor, National, Old Reliable, Poss, Schmidt, Stegeman, Sternberg, A. O. Smith, Schacht, U. S. Motor, Universal, Velie and Wilcox. At the Chicago show last year there were fifty-one makes represented.

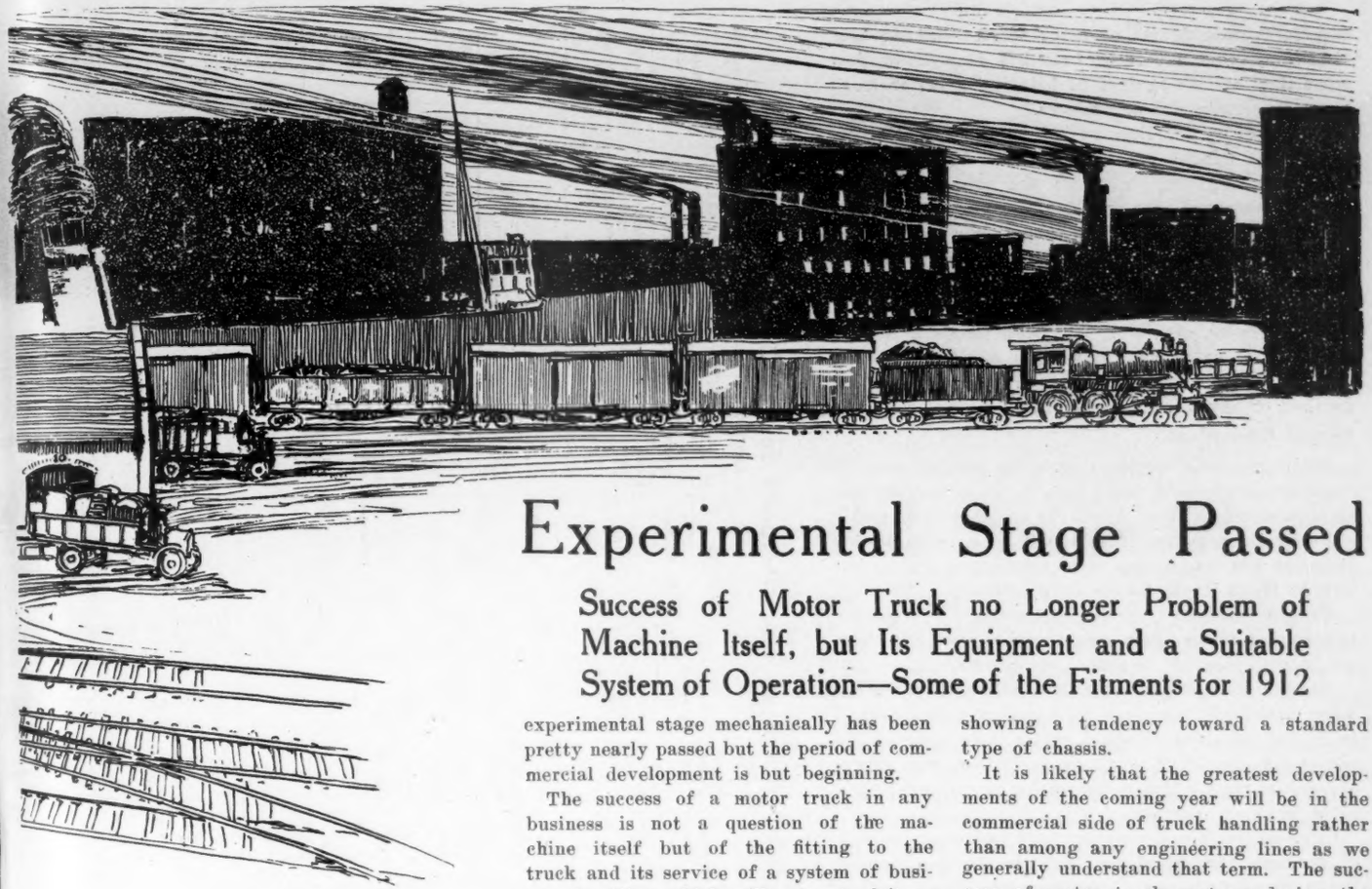
At the palace show this year will be seen the Argo, Atlantic, Atterbury, Bowl-business is no longer a problem of the ing Green, Chase, Commer, Cortland, Dart, Dayton, Durant-Dort, Decatur, Eclipse, Federal, Gramm, Kelly, Lauth-Juergens, Lippard-Stewart, Maxim, Motor Wagon, Newark, Packers, Progress Development Co., Sanford-Herbert, Schacht, Schlotterback, Sullivan, Smith, Velie, Veerac, Walker, Walter.

The garden show list includes: Alco, Anderson, Autocar, Baker, Bronx, Brush, Buick, Cartercar, Garford, G. M. C., General Vehicle, Grabowsky, Knox, Locomobile, Lozier, McIntyre, Mack, Hewitt, Morgan, Packard, Peerless, Pierce-Arrow, Pope-Hartford, Sampson, Speedwell, Stearns, Studebaker, Ward, White.

At Chicago will be: Avery, Atterbury, Alco, Anderson, Adams, Baker, Brush, Buick, Cartercar, Clarke, Chicago Commercial, Commer, Commerce, Durant-Dort, Dayton, Dorris, Eclipse, Federal, Grabowsky, Garford, Gramm, General Vehicle, Harders, Hewitt, Indiana, Kelly, Knox, Kissel, Locomobile, Lozier, Lauth-Juergens, McIntyre, Mack, Mais, Morgan, Motor Wagon, Mercury, National, Old Reliable, Packard, Peerless, Pierce-Arrow, Pope-Hartford, Poss, Rambler, Rapid, Rassell, Reo, Reliance, Stearns, Schmidt, Staver, Sampson, Stegeman, Sanford-Herbert, Smith, A. O., Schacht, Speedwell, Service, U. S. Motor Truck, White, Waverley, Walker, Wilcox.

All of these are gasoline machines with the exception of the Baker, Bronx, General Vehicle, Ward, Argo, Anderson and Waverley, which are electrics.

At the shows one can see readily that the past year has taught a number of lessons both in the matter of the motor truck itself as a mechanism and in the line of its proper adaptation to modern business. The



Experimental Stage Passed

Success of Motor Truck no Longer Problem of Machine Itself, but Its Equipment and a Suitable System of Operation—Some of the Fitments for 1912

experimental stage mechanically has been pretty nearly passed but the period of commercial development is but beginning.

The success of a motor truck in any business is not a question of the machine itself but of the fitting to the truck and its service of a system of business handling which will get out of it as a transportation instrument what it is capable of doing; in other words, of surrounding the truck with a system of handling of goods which will keep it idle the least time in a working day.

Mechanically there are a number of fitments to motor truck machinery which are gaining favor and have increasing use. Through the reliability runs of the year it has been well learned that the race is not necessarily to the swift in the commercial vehicle line but that the greater reliability gained through slower speeds in truck service on hard tires means more speed in the end, and less upkeep cost, to say nothing of fewer delays.

This has led to a more general adoption of the governor especially for the larger sized trucks, speeds being thus reduced to rational limits. Since drivers cannnot be depended on to run at low speeds the governor has been added to insist. Dual tires have become standard.

Motors are increasing in stroke and refinement and more is being done to protect power plant and transmission from excessive vibration. The sleeve-type motor has not yet appeared on any motor truck in this country.

The worm type of drive is still watched with considerable of interest but has not materially increased in its number of manufacturers.

Altogether the manufacturing changes have been in most cases refinements instead of real reconstructions of any parts, showing a tendency toward a standard type of chassis.

It is likely that the greatest developments of the coming year will be in the commercial side of truck handling rather than among any engineering lines as we generally understand that term. The success of motor truck systems during the coming few years will depend more on the commercial engineer, the transportation and delivery expert, than on the factory superintendent or designer. Trucks are here to stay and there are many good ones but that firm is going to hold the greatest number of sales to its credit that can make the best financial showing with its trucks in the greatest number of businesses. One truck may be as good as its neighbor truck, but if the agent of the first concern knows how to advise a purchaser as to a shipping system which will save him money used in connection with a motor delivery vehicle or truck, while the other merely gives an exposition on the merits of the machine he has, the first man with the business idea will get the ear of the buyer. What the buyer of the commercial vehicle wants is a credit showing on his books as the result of motor truck use, not to be able to tell his friends that he paid $5,000 for it or that it has six coats of varnish.

Makers Collecting Data

The really big truck concerns are collecting data as to the operation of their trucks and in doing so many are trying to keep their figures secret. In so doing they are gaining nothing definite and through this attitude are hindered from obtaining figures from other concerns which would be of value in their sales, without hindering the firm from which the information came. There is a wide need among the whole line of manufacturer, agent and

user for actual figures of truck service and working conditions, that all three branches may know just what they are up against in bringing a motor truck into any certain line of business.

Trucks fit certain lines of industry now, and others they never will fit until the conditions of operation, receiving of goods, or traffic are changed. Every dealer, maker and user should have figures relating to all these things, and data on such things for instance as loading time, lost time in traffic, mistakes of drivers, alley congestion and its causes, location of coal holes in a major number of cases, peculiar requirements of building trades, etc., etc. All these things it will be necessary to know some day when one wants to sell a truck for a certain business, or make a body for another, or buy a truck for another.

Service Guarantees

Real commercial engineering is the greatest need of the year, for without being able to fit a business system to a truck so that it can run to capacity or nearly so, there is little use of selling it to an unsuspecting customer who has no means of knowing or finding out how to make it pay unless he be told.

Even a so-called "service guarantee" will not appeal to a customer like a good business plan; and there are many kinds of "service guarantees."

To obtain success in some lines of truck use in our large cities will demand a co-operation among dealers in having laws passed which will relieve some of the causes for congestion of alleys and streets and delays of various sorts which might easily be remedied by a little working together.

In its beginnings the motor truck took over so much of pleasure car experience that the development of the machine itself was a comparatively simple matter. Trucks were made almost at the start that would deliver loads with astonishing regularity, and indeed some of the old ones are still maintaining their regular schedule in actual business service.

With the later trucks, increased in size, tonnage and horsepower there was at first a cry for speed, and it was not unusual for a truck salesman to glibly state that his machine would do 30 miles an hour with full load. This was the truth in many cases and with a driver who knew no better, many trucks were operated in spurts at this speed until something gave way—and then the truck was blamed.

Then it was that makers studied more carefully the matter of speeds and vibration and their relation, and came to the conclusion that, though the power was there to go faster, there must be a way of limiting the driver to sensible speeds to save the machinery of the truck from crystallization and breakage. With this the governor was put on and sealed, and the results of its use have more than justified its fitting.

In a recent reliability run a big truck with a governor limiting its speed to 12 miles an hour beat a greater part of the machines into the controls, trucks which in many cases were capable of a speed of 30 miles an hour. Some of the makes fitted with governors had them disconnected for this run, and several suffered thereby.

The governor on the large truck has proved itself, and probably will be with us until drivers grow to be ideal, and our streets perfectly surfaced.

Dual tires have taken the place of all others in nearly every case of heavy tonnage, but there is yet a need for an efficient non-skid device which will not cut the tires.

There are many little devices and handy fitments added to this year's models which will help consider-

Motor Specifications of Commercial Cars Made by American Manufacturers for 1912

No.	NAME AND MODEL	BODY	Weight	Price	Load Platform in Feet	Total Length in Feet	No. Cyl.	Bore	Stroke	H. P. S.A.E.	Piston Disp.	Cylinder Type	Cylinder, How Cast	Valve Location	COOLING			IGNITION			CARBURETER		Motor Lubr.
															Circulation	Radiator	System	Magneto	Control	Design	Fuel Feed	
1	Acorn, H	Optional	1,000	.....	6.5x3.7	.....	2	5.00	4.00	20.0	157.1	L-Head	Separate	Side	Thermal	Tube	Single	.....	Hand	Schebler	Gravity	Splash
2	Adams, A	"	2,000	2,100	8.6x3.7	15	4	3.87	5.00	24.0	235.8	"	En bloc	Opposite	Pump	"	Dual	Eisemann	"	Kingston	"	"
3	Alco, 2-ton	"	4,000	2,950	Optional	14.7	4	4.50	5.50	32.4	349.9	"	Pairs	Side	"	"	"	Bosch	"	Newcomb	"	"
4	Alco, 3½-ton	"	7,000	3,650	"	17.5	4	5.00	6.00	40.0	471.2	"	"	"	"	"	"	"	Fixed	"	"	"
5	Alco, 5-ton	"	10,000	4,750	"	19.5	4	5.00	6.00	40.0	471.2	"	"	"	"	"	"	"	"	"	"	"
6	Alco, 6½-ton	"	13,000	5,500	"	19.5	4	5.00	6.00	40.0	471.2	"	"	"	"	"	"	Splitdorf	Hand	Schebler	"	Forced
7	Anglaise, L	Express	700	800	5x3	10.3	2	5.00	4.00	20.0	157.1	"	Separate	"	Thermal	Cell	"	"	"	"	"	"
8	Anglaise, B	"	1,000	1,050	8x3.3	12.3	2	5.25	4.00	22.0	173.2	"	Pairs	"	"	"	Double	"	"	"	"	"
9	Anglaise, C	"	1,500	1,475	8.6x3.6	13.3	4	3.75	4.50	22.5	198.8	"	Separate	"	"	Tube.	Single	Bosch	Fixed	"	"	Splash
10	Anna	Optional	.....	925-1050	.....	.....	2	5.25	4.00	22.0	173.2	"	"	"	"	"	"	"	"	"	"	"
11	Atlas, L	Express or Panel	1,500	1,750	7.5x3.6	13.3	2	4.50	4.50	.....	143.1	2-Cycle	Pairs	.....	Pump	Cell,	"	.....	Hand	Own	"	In Fuel
12	Atlas, C	"	4,000	2,800	11x5.5	17.5	4	4.50	4.50	25.6	286.3	L-Head	En bloc	Lt. Side	"	Tubs.	Double	Bosch	Fixed	Schebler	"	Forced
13	Atterbury, B	Optional	2,000	.....	8x4	.....	4	4.00	4.50	28.9	226.2	"	"	"	"	"	"	"	"	"	"	"
14	Atterbury, C	"	4,000	.....	10x5	.....	4	4.25	5.50	28.9	312.0	T-Head	"	Opposite	"	"	"	"	"	"	"	"
15	Atterbury, D	"	6,000	.....	12x6	.....	4	4.87	5.50	38.0	410.6	"	Pairs	"	"	"	"	"	"	"	"	"
16	Autocar, 21-C	"	3,000	2,150	.....	.....	2	4.75	4.50	18.0	159.5	L-Head	Separate	Side	"	"	Single	"	"	Stromberg	"	"
17	Avery, 2-ton	Platform	4,000	2,500	10.3x4.3	16	4	4.75	5.00	36.1	354.4	"	"	"	"	Optional	Dual	Eisemann	"	Vortex	"	"
18	Avery, 3-ton	"	6,000	3,200	12.3x6.3	19.8	4	4.75	5.00	36.1	354.4	"	"	"	"	"	"	"	"	"	"	"
19	Babcock, G	Optional	1,400	2,400	.....	.....	2	5.25	4.00	22.0	173.2	"	"	"	"	Tube	"	Bosch	"	Schebler	"	"
20	Barker, B	Express or Flat	6,000	3,200	14x6	20.3	4	5.00	4.75	40.0	373.0	L-Head	Pairs	Side	Pump	Cell	"	Remy	Hand	Mayer	Gravity	"
21	Barker, B	"	10,000	3,700	14x6.5	20.3	4	5.00	4.75	40.0	373.0	"	"	"	"	"	"	"	"	"	"	"
22	Beck, D-201	Optional	2,000	1,700	9x4.8	13.0	4	3.50	5.00	19.6	173.2	"	Separate	"	"	"	Single	"	"	Schebler	"	Splash
23	Beck, D-212	"	3,000	2,000	10x5	14.0	4	4.00	5.00	25.6	251.3	"	"	"	"	"	"	"	"	"	"	"
24	Beck, E-218	"	4,000	2,400	10x5	14.0	4	4.00	5.50	25.6	276.5	"	"	"	"	"	"	"	"	"	"	"
25	Beck, H-224	Bus	5,000	3,000	10.5x5.5	17.0	4	4.25	5.50	28.9	312.0	"	"	"	"	"	"	"	"	"	"	"
26	Beck, F-226	Optional	8,000	2,800	10x5	14.0	4	4.50	6.00	32.4	381.7	"	"	"	"	"	"	"	"	"	"	"
27	Bergdoll, C-30	Delivery	1,500	1,600	.....	.....	4	4.00	4.50	25.6	226.2	"	En bloc	.....	"	"	Dual	Bosch	"	Mayer	.....	"
28	Bessemer, 10-B	Covered or Stake	1,000	1,000	7.5x3.5	.....	4	4.00	4.00	.....	150.8	2-Cycle	Separate	"	Thermal	"	Single	"	"	Stromberg	Pressure	Forced
29	Bessemer, A	Express	2,000	1,950	6.7x4	13.3	3	3.75	5.25	22.5	231.9	L-Head	En bloc	Side	"	Tube	"	.....	Gov.	Kingston	Gravity	"
30	Best, 812	Open or Closed	800	.....	5.3x3.3	9.7	2	4.50	4.50	16.2	143.2	"	Separate	"	"	"	"	.....	Fixed	Stromberg	"	Splash
31	Blair, 1½-ton	Express	3,000	2,750	11x5	16.0	4	4.13	5.00	27.3	267.3	"	En bloc	"	Pump	"	Dual	Bosch	Fixed	"	"	"

NOTE—Where body is optional, price usually refers to chassis alone. Abbreviations: Thermal, thermo-syphon circulation; Tube, tubular radiator; Cell, cellular or honeycomb radiator. Bore and stroke are given in decimals to the nearest 1-100th inch: as, 4.50=4½, etc., .06=1-16, .13=⅛, .19=3-16, .25=¼, .31=5-16, .38=⅜, .44=7-16, .50=½, .56=9-16, .63=⅝, .69=11-16, .75=¾, .81=13-16, .88=⅞, .94=15-16, 1=1.00.

Transmission and Running Gear Specifications of American Commercial Cars for 1912

Table No.	NAME AND MODEL	RUNNING GEAR						TRANSMISSION									BEARINGS					
		Wheel Base	TIRES		SPRINGS		Front Axle	CLUTCH		GEARSET			Drive	Car Drives Through	Rear Axle	BRAKES		CRANKSHAFT		Gearset	Front Wheel	Rear Axle	Steering Knuckle	Steering Gear
			Front	Rear	Front	Rear		Type	Friction Surface	Type	No. Speeds	Location				Serv.	Em.	Type	No.					
1	Acorn, H	96	34x2½	30x3	El	El	Tube	M D	S & B	Frict	3	Amid	Chain	R. R	Dead	Int	Int	Plain	2	Plain	Ball	Ball	Plain	Plain
2	Adams, A	121	36x3	30x3½	½ El	½ El	I B	"	"	Sel	3	"	"	"	"	Ext	"	"	3	Ball	Roller	"	B & P	B & P
3	Aloe, 2-ton	112	36x4	30x3½	"	"	Rect	"	"	"	3	"	"	"	"	Jack	"	"	3	"	"	"	.....	"
4	Aloe, 3½-ton	126	36x5	30x4*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	.....	Ball
5	Aloe, 5-ton	144	36x6	42x5*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	.....	"
6	Aloe, 9½-ton	144	36x7	42x6*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	Plain
7	Anglaise, L	88	.x2	.x2	El	El	Solid	"	Steel	Plan	2	"	"	"	"	"	"	"	2	Plain	Ball	"	.....	Ball
8	Anglaise, B	100	.x2	.x2	"	"	"	"	"	"	2	"	"	"	"	"	"	"	2	"	"	"	.....	"
9	Anglaise, C	150	.x2½	.x3	"	"	"	"	"	"	2	"	"	"	"	Jack	"	"	2	"	Roller	"	Roller	"
10	Anna	100	.x2½	34x3½	½ El	"	I B	"	S & F	"	2	"	"	"	"	"	"	"	2	"	"	"	"	"
11	Atlas, L	102	32x4	32x4½	"	½ El	"	"	Ray	Sel	3	U M	Shaft	Springs	Float	Ext	Trans	Roller	3	Roller	Roller	"	Plain	Plain
12	Atlas, C	144	34x4	34x4	"	"	"	"	"	"	3	"	Chain	R. R	Dead	Int	Int	Plain	3	"	"	"	Roller	"
13	Atterbury, B	125	36x3½	36x4	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	Ball	"
14	Atterbury, C	144	36x3½	36x4*	"	"	"	"	"	"	3	Amid	"	"	"	Jack	"	"	3	"	"	"	"	"
15	Atterbury, D	154	36x4	36x4*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	Ball	"
16	Autocar, 21-C	97	34x3½	34x4	"	Plat	Tube	"	S & I	Prog	3	"	Shaft	Springs	Float	Ext	"	Ball	2	"	"	"	Plain	Plain
17	Avery, 2-ton	140	.x4	.x3½*	"	½ El	Spec	"	Steel	Sel	3	"	Chain	R. R	Dead	Int	"	Plain	5	"	"	"	B & P	"
18	Avery, 3-ton	140	.x5	.x4*	"	"	"	"	"	"	3	"	"	"	"	Jack	"	"	5	"	"	"	"	"
19	Babcock, G	100	34x3	34x3	"	½ Plat	I B	"	"	"	3	Jack	"	"	"	"	"	"	3	"	Ball	"	B & P	B & P
20	Barker, B	150	.x3½	.x4*	.....	.....	"	"	S & B	"	3	"	"	"	"	.....	.....	.....	.....	"	"	Ball	.....	.....
21	Barker, B	150	.x4	.x5*	.....	.....	"	"	"	"	3	U M	"	"	"	"	"	"	3	"	"	"	Ball	Ball
22	Beck, D-201	110	36x3	36x3	Flat	Flat	Solid	"	Steel	"	3	"	"	"	"	"	"	"	5	"	"	"	"	"
23	Beck, D-212	110	36x3½	36x3½	"	"	"	"	"	"	3	"	"	"	"	"	"	"	5	"	"	"	"	"
24	Beck, E-218	110	36x3½	36x4	"	"	"	"	"	"	3	"	"	"	"	"	"	"	5	"	"	"	"	"
25	Beck, H-224	130	36x3½	36x4	½ El	"	"	"	"	"	3	"	"	"	"	"	"	"	5	"	"	"	"	"
26	Beck, F-226	110	36x4	36x6*	Plat	"	"	"	"	"	3	"	"	"	"	"	"	"	5	"	"	"	"	"
27	Bergdoll, C-30	115	34x3½	34x3½	½ El	½ Plat	I B	"	A & I	"	3	"	Shaft	R. R	Float	Ext	Int	Ball	3	"	B & R	"	B & R	B & R
28	Bessemer, 10-B	100	34x4	34x4	"	½ Plat	"	Cone	L & C	"	3	Amid	Chain	"	Dead	Int	"	Plain	3	Ball	Roller	"	Ball	Ball
29	Bessemer, A	105	34x2½	34x3	"	Plat	"	"	Leath	"	3	Jack	"	"	"	"	"	"	3	Roller	"	"	Plain	Plain
30	Best, 512	70	32x2	34x2	"	El	Solid	"	"	Frict	Any	Amid	"	"	"	Ext	Ext	"	3	Ball	B & R	"	Roller	Ball
31	Blair, 14-ton	114	34x4	34x3*	"	½ El	I B	Cone	L & C	Sel	3	"	Worm	.....	Float	Ext	"	"	3	"	"	"	"	"

NOTE—*Tires are dual. Abbreviations: Clutch: M. D., multiple disk; Con., contracting band; Exp., expanding band. Friction surface: Lin., linobestos; Ther., thermoid; A., asbestos; F., fiber; B., bronze; Leath., leather; S., steel; C., cork inserts; Cp., copper. Gearset location: Amid., amidship; U. M., in unit with the motor; Jack, on jackshaft; R. A., on the rear axle. Drive: Worm, shaft with worm gear. Car drives through: T. T., torsion tube; R. R., radius rod; T. R., torsion rods; S., springs. Brakes: Jack, on jackshaft; Int., internal expanding on rear hubs; Ext., external contracting on rear hubs; Trans., on transmission. Springs: El., elliptic; Plat., platform. Front axle: I B, I-beam; Chan., channel.

ably in increasing the handiness of the motor truck and yet for certain classes of work there are still some things to be desired.

For work in narrow streets and alleys trucks should be able to turn in a much smaller radius, much time being wasted with the present machines with small action of the steering arms, in backing into alley unloading platforms and swinging in between standing teams in congested places. A short wheelbase would help considerably for many classes of service where these conditions obtain.

Dumping Bodies

Dumping bodies and elevating bodies have come to stay and we look for conveyor bodies in the future which can unload soft coal, for instance, which will not run out of a chute freely like hard coal, and deliver it say to a window higher up than the car body, or around a corner some distance away. A belt-conveyor scheme may be used or a chain-and-bucket proposition, but one can look for some sort of body soon which will meet the conditions which a dump body will not help.

Accessibility must be sought for in motor truck designs as well, for the fact that a truck may be repaired and put on the road again in less time than its competitor in case of breakage is a factor in sales.

In the past there has been a serious question in the matter of tires and how to provide for replacements. When tires wore down it meant the putting on of a new wheel which could not always be had, or the laying up of the truck while new tires were put on. With the advent of tires quickly removed and replaced much of this difficulty will be done away with and a spare tire can even be carried on the road for emergencies.

Repairs to a pleasure car can be attended to in idle hours but repairs to a truck means a loss of service; a pleasure car works in spurts but a truck should be designed for a "continuous performance." Thus all the improvements and refinements that make for lessened hours of idleness are a step forward toward the goal of universal motor truck use.

While pleasure car makers have been vieing with each other in the fitting of self-starters of many and various kinds, no motor truck maker has so far taken advantage of the opportunity and fitted such a device to a commercial vehicle. There is, however, a direct need for such a fitment, for the average driver under present conditions leaves his motor running on all but long stops to save the trouble of cranking. There usually is a greater difficulty in the starting of a truck motor as well, and in the event of the stalling of a motor in traffic a greater delay in restarting than in the case of the touring car. All this means obstructed traffic and a loss of efficiency in the truck itself. With another year's progress the self-starter will probably be a feature.

Early trucks were, many of them, underpowered, the idea being that if the vehicle travelled so much slower than a pleasure car a smaller powered motor would be ample for the needs. Road use, however, has brought the smaller trucks even into the four-cylinder class, and many of the two-cylindered machines have increased their bore and stroke.

Motor Specifications of Commercial Cars Made by American Manufacturers for 1912

No.	NAME AND MODEL	BODY	Weight	Price	Load Platform in Feet	Total Length in Feet	No. Cyl.	Bore	Stroke	H. P. S.A.E.	Piston Disp.	Cylinder Type	Cylinder, How Cast	Valve Location	COOLING		IGNITION			CARBURETER		Motor Lubr.
															Circulation	Radiator	System	Magneto	Control	Design	Fuel Feed	
32	Blair, 2½-ton	Stake	5,000	3,000	11.5x5.5	16.5	4	4.50	5.50	32.4	349.9	L-Head	Pairs	Side	Pump	Tube	Dual	Bosch	Fixed	Stromberg	Gravity	Forced
33	Blair, 3½-ton	"	7,000	3,500	12.5x6	17.5	4	4.50	5.50	32.4	349.9	"	"	"	"	"	"	"	"	"	"	"
34	B. O. E., A-2	Optional	4,000	2,250	10x6	14.0	4	4.50	5.00	32.4	318.1	"	"	"	"	"	"	"	Hand	Schebler	"	Splash
35	B. O. E., A-3	"	6,000	3,000	9x6	14.0	4	5.00	6.50	40.0	510.5	"	"	"	"	"	"	"	"	"	"	"
36	B. O. E., A-6	"	12,000	6,000	14x6	19.0	4	5.25	8.00	44.1	692.7	"	"	Hd. & Side	Thermal	"	Double	"	"	"	"	Forced
37	Brush	Delivery	600	650			1	4.00	5.00	6.4	62.8	"	Separate	Side	"	"	Single		"	Kingston	"	Splash
38	Buick	Express	2,000	,000	7.4x5.5		2	4.50	5.00	16.2	159.0	"	"	Head	Pump	"	"	Remy	"	Schebler	"	Forced
39	Cameron	Delivery		650			4	3.87	3.75	24.0	176.9	I-Type	"	"	Air		Optional		"		"	"
40	Cameron	Express or Stake		1,400			4	3.87	3.75	24.0	176.9	"	"	"	"		"		"		"	"
41	Cartercar, T	Open	1,500	1,250	6.2x3.7	13.0	2	4.50	4.50	16.2	143.2	L-Head	"	Hd. & Side	Thermal	Tube	Dual	Remy	"	Schebler	"	"
42	Cartercar, T	Screen Panel	1,500	1,300	6.2x3.7	13.0	2	4.50	4.50	16.2	143.2	"	"	"	"	"	"	"	"	"	"	"
43	Cartercar, T	Panel	1,500	1,350	6.2x3.7	13.0	2	4.50	4.50	16.2	143.2	"	"	"	"	"	"	"	"	"	"	"
44	Cass, D	Optional	2,000	1,850	7.5—11x5	15—19	4	4.00	4.50	25.6	226.2	"	En bloc	Side	"	Cell	Optional	Bosch	"	Kingston	"	Splash
45	Cass, 2-ton	"	4,000	2,650	9–13x6	16.5–20.5	4	4.25	5.00	28.9	283.6	"	Separate	Hd. & Side	Pump	"	"	"	"	"	"	"
46	Chase, D	Express or Panel	1,500	900	5.8x3.7	12.0	3	4.13	4.00		160.4	2-Cycle	"		Air		Single	"	Fixed	Holley	"	In Fuel
47	Chase, H	"	2,000	1,250	6.8x3.7	13.0	3	4.13	4.00		160.4	"	"		"		"	"	"	"	"	"
48	Chase, K	"	2,000	1,400	6.8x3.7	13.0	3	4.13	4.00		160.4	"	"		"		"	"	"	"	"	"
49	Chase, L	"	3,000	1,750	7.8x4.2	15.0	3	4.50	5.00		238.6	"	"		"		"	"	"	"	"	"
50	Chase, J	Express	4,000	2,200	10x4.2	16.0	3	4.50	5.00		238.6	"	"		"		"	"	"	"	"	"
51	Clark Power Wag.A	"	2,000	1,600	8x3.8		2	5.00	5.50	20.0	215.9	L-Head	"	Side	Thermal		Double	U. & H.	"	Schebler	"	Forced
52	Coleman, A-3	Optional	1,200	1,150	7x3.5		2	4.50	4.50		143.1	2-Cycle	"		Pump	Cell	"	K-W	Hand	Stewart	"	In Fuel
53	Commer, 4½-ton	"	9,000	4,500	12x6	19	4	4.31	5.50	31.0	321.3	L-Head	Pairs	Lt. Side	Thermal	Tube	"	Bosch	"	Claudel	"	Splash
54	Commerce		1,000				4	3.25	3.37	16.9	112.0	"	"	Side	"	"			Fixed	Schebler	"	"
56	Cortland, ¾-ton	"	1,500	1,100	6.8x3.8		2	4.25	4.25	14.5	120.5	"	Separate	"	"	Cell		Remy	Hand	"	"	Forced
56	Cortland, 1¼-ton	"	3,000	1,750		11.5	2	5.25	5.50	22.0	238.1	"	"	"	Pump	"	Dual	"	"	"	"	"
57	Couple-Gear, H-C	"	7,000	4,950	14x5.5	18.5	4	5.25	6.00	44.1	519.5	T-Head	"	Opposite	"	Tube	"	Bosch	"	Stromberg	"	"	Splash
58	Couple-Gear, A-C	"	10,000	5,400	14x6	18.5	4	5.25	6.00	44.1	519.5	"	"	"	"	"	"	"	"	"	"	"
59	Crawford, 12-30	Delivery	1,200	1,350			4	4.13	4.75	27.3	253.9	L-Head	En bloc	Side	"	"	"	Remy	"	"	"	"
60	Crown, A	Optional	1,500	1,200		13	4	3.75	4.50	22.5	198.8	T-Head	Separate	Opposite	Thermal	"	"	"	"	Schebler	"	"
61	Dart, E-E	Open	1,500	650			2	4.25	5.00	14.5	141.8		"		"	Cell		Splitdorf	"	"		Forced
62	Day Utility, B	Delivery	1,000	1,150	8x3		4	4.00	4.50	25.6	226.2	L-Head	Pairs	Side	Pump	Tube	Double	Bosch	Hand	"	Gravity	Splash
63	Denniston	Optional	1,500	2,000	8.3x4	11.5	2	4.00	4.75	12.8	119.4	"	En bloc	"	"					Kingston		
64	Det. Motor Wag., A	"	800	610	5.5x3.7	11.0	2	4.00	4.00		100.5	2-Cycle	Separate		Thermal		Single	"	Fixed	Holley	Gravity	Forced
65	Dispatch, I	Open or Closed	600	700	4x3	12.0	2	3.50	5.00		96.2	"	"		Air		"	Simms	Hand	Schebler	"	In Fuel
66	Dispatch, Express	"	1,000	900	7x3	14.5	4	3.50	5.00		192.4	"	"		"		"	"	"	"	"	"
67	Dorris, G	Express	1,500	2,400	5.8x3.8		4	4.38	5.00	30.6	300.7	I-Type	Pairs	Head	Pump	Cell	Dual	Bosch	"	Stromberg	"	Splash
68	Dorris, G	Stake	3,000		9.5x5.7	17	4	4.38	5.00	30.6	300.7	"	"	"	"	"	"	"	"	"	"	"
69	Durable Dayton, H	Stake or Express	4,000	2,500	11x4.5	16.5	4	4.50	5.00	32.4	318.1	T-Head	"	Opposite	"	Tube	Double	"	"	"	"	Forced
70	Durable Dayton, K	"	6,000	3,500	12.5x6	17.5	4	4.75	5.50	36.1	389.9	"	"	"	"	"	"	"	"	"	"	"
71	Durable Dayton, M	"	10,000	4,500	13.5x5.6		4	5.25	7.00	44.1	606.1	"	"	"	"	"	"	"	"	"	"	"
72	Duryea	Delivery		550			2	3.75	3.75		82.8	2-Cycle	Separate		Air		Single		"	Heitger	"	In Fuel
73	Evans, I	Closed	1,500	1,200	4.7x3.7	12.3	4	4.00	4.00	25.6	201.1	L-Head	Pairs	Lt. Side	Thermal	Tube	"	Bosch	"	Schebler	"	Splash
74	Federal, C	Optional	2,000	1,800	8.5x5.2	15.3	4	4.25	4.50	28.9	255.3	"	"	Lt. Side	Pump	"	"	"	Fixed	Stromberg	"	"
75	Federal, D	"	2,000	1,800	12x5.2	18.5	4	4.25	4.50	28.9	255.3	"	"	"	"	"	"	"	"	"	"	"
76	Ford	Delivery		700			4	3.75	4.00	22.5	176.7	"	En bloc	"	Thermal	"	"	Own	Hand	Optional	"	"
77	Franklin, L-5	Express	2,000	2,500	8x3.5	12.5	4	3.38	4.00	18.3	143.1	I-Type	Separate	Head	Air		"	Bosch	Fixed	Own	"	Forced
78	Franklin, L-5	Platform	2,000	2,400	8x5	12.5	4	3.38	4.00	18.3	143.1	"	"	"	"		"	"	"	"	"	"
79	Franklin, K-6	Taxicab	5-pass	2,850		12	4	3.38	4.00	18.3	143.1	"	"	"	"		"	"	"	"	"	"
80	Franklin, O-1	Delivery	1,000	2,350	5x3.3	14.5	4	4.00	4.00	25.6	201.1	"	"	"	"		"	"	"	"	"	"
81	Frontenac	Optional	6,000	3,500		17.2	4	5.00	5.75	40.0	451.6	L-Head	Pairs	Lt. Side	Pump	Cell	Dual	Optional	Optional	Stromberg	"	"
82	Frontenac, F	"	8,000	3,650		17.2	4	5.00	5.75	40.0	451.6	"	"	"	"	"	"	"	"	"	"	"
83	F-S	Closed	800	600			1					"		Side	Thermal	"	Single				"	Splash
84	F-S	Express	1,500	1,000	5x3.3		4	4.38	4.75	30.7	285.6	"	Pairs	Lt. Side	Pump	Tube	Dual	Remy	Hand	Stromberg	"	"
85	F-S	Platform	7,000	3,500	12x6		4	4.75	5.25	36.1	372.1	"	"	"	"	"	"		"		"	"
86	*Garford, D	"	10,000		12.2x5.6	16.9	4	4.25	5.25	28.9	297.8	"	En bloc	"	"		"		"	Own	"	"
87	Geneva, B	Express	1,200	1,300	6.5x3.5	11.5	2	5.13	4.50	21.0	185.6	"	Separate	Side	"	Tube	Single	Optional	Fixed	Schebler	"	Forced
88	Geneva, C	Panel	1,000	1,350	6x3.5	11.0	2	5.13	4.50	21.0	185.6	"	"	"	"	"	"	"	"	"	"	"
89	Glide	Open & Closed	1,500	2,000			4	4.75	5.00	63.1	354.4	"	"	Rt. Side	"	Cell	Dual	Eisemann	Hand	"	"	Splash
90	G-M-C., V	Optional	2,000	2,300	8x4.7	15.8	4	3.50	5.25	19.6	202.0	"	En bloc	"	"	Tube	"	Bosch	Gov	Optional	"	Forced
91	G-M-C, S	"	4,000	2,750	11x5.3	19.4	4	4.00	6.00	25.6	301.6	"	"	"	"	"	"	"	"	"	"	"

NOTE—Where body is optional, price usually refers to chassis alone. Abbreviations: Thermal, thermo-syphon circulation; Tube., tubular radiator; Cell., cellular or honeycomb radiator. Bore and stroke are given in decimals to the nearest 1-100th inch: as, 4.50=4½, etc., .06=1-16, .13=⅛, .19=3-16, .25=¼, .31=5-16, .38=⅜, .44=7-16, .50=½, .56=9-16, .63=⅝, .69=11-16, .75=¾, .81=13-16, .88=⅞, .94=15-16, 1=1.00.

Transmission and Running Gear Specifications of American Commercial Cars for 1912

Table No.	NAME AND MODEL	RUNNING GEAR								TRANSMISSION								BEARINGS						
		Wheel Base	TIRES		SPRINGS		Front Axle	CLUTCH		GEARSET			Drive	Car Drives Through	Rear Axle	BRAKES		CRANKSHAFT		Gearset	Front Wheel	Rear Axle	Steering Knuckle	Steering Gear
			Front	Rear	Front	Rear		Type	Friction Surface	Type	No. Speed	Location				Serv.	Em.	Type	No.					
32	Blair, 2½-ton	121	34x4	36x3½*	½ El	½ El	I B	Cone	L & C	Sel	3	Amid	Worm	.....	Float	Ext	Ext	Plain	3	Ball	Roller	B & R	Roller	Ball
33	Blair, 3½-ton	121	36x5	36x4*	"	"	"	"	"	"	3	"	"	.....	"	"	"	"	3	"	"	"	"	"	"
34	B. O. E., A-2	144	34x4	36x4½	"	"	Square	M D	Steel	"	3	"	Chain	R R	Dead	"	Int	"	3	"	Ball	Ball	Plain	Plain
35	B. O. E., A-3	148	36x5	36x3½*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"	"
36	B. O. E., A-6	154	36x6	40x6*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	.....	"	Plain	"	"
37	Brush, Delivery	80	28x3	28x3	Coil	Coil	Wood	"	S & B	Plan	2	"	"	"	"	Int	.....	"	2	B & P	"	B & R	"	"
38	Buick, Express	92	32x4	32x4	¾ El	½ El	I B	Cone	.....	"	.....	"	"	"	"	"	"	"	2	Plain	Roller	"	B & P	"
39	Cameron	104	32x3	32x3	½ El	El	Tube	"	Leath	Sel	3	R A	Shaft	T T	Float	Ext	Int	"	3	Ball	Ball	Ball	Plain	"
40	Cameron	108	36x2½	36x2½	El	"	Solid	"	"	"	3	"	Chain	"	Dead	"	"	"	3	"	"	"	"	"
41	Cartercar, T	98	34x2½	36x2½	½ El	½ El	Tube	.....	.....	Frict	Any	Amid	"	R R	"	Int	Trans	"	2	"	"	"	"	"
42	Cartercar, T	98	34x2½	36x2½	"	"	"	.....	.....	"	"	"	"	.....	"	"	"	"	2	"	"	"	"	"
43	Cartercar, T	98	34x2½	36x2½	"	"	"	.....	.....	"	..	"	"	.....	"	"	"	"	2	"	"	"	"	"
44	Cass, D	116–142	34x3½	34x4	"	Plat	Rect	Cone	L & I	Sel	2	"	"	R R	"	.....	.....	"	2	B & R	Roller	Roller	"	Ball
45	Cass, 2-ton	124–144	34x3½	38x3½*	"	½ El	"	M D	S & R	"	4	U M	"	"	"	Jack	Int	"	5	Ball	"	"	"	Plain
46	Chase, D	100	36x2	38x2	El	El	Solid	.....	.....	Plan	2	Amid	"	"	"	Ext	.....	"	4	B.P&R	Ball	Ball	"	"
47	Chase, H	106	36x2	38x2½	"	½ Plat	"	.....	.....	"	2	"	"	"	"	"	.....	"	4		"	"	"	"
48	Chase, K	106	36x2	38x2½	"	"	"	Cone	I & C	Sel	3	"	"	"	"	"	Jack	"	4	"	"	"	"	"
49	Chase, L	112	36x3	38x3½	"	"	"	"	"	"	3	"	"	"	"	"	"	"	4	"	"	"	"	"
50	Chase, J	120	36x3½	38x4	"	"	"	"	"	"	3	"	"	"	"	"	"	"	4	"	"	"	"	"
51	Clark Power Wagon, A	102	36x2½	36x2½	½ El	½ El	"	"	.....	"	2	"	"	"	"	.....	.....	"	2	Ball	Roller	Roller	"	"
52	Coleman, A-3	96	..x2½	..x2½	El	El	Square	M D	Steel	"	.....	"	"	"	"	Int	Jack	"	.....	Plain	Ball	Ball	"	Ball
53	Commer, 4½-ton	144–156	35x5	35x5	½ El	½ El	I B	Cone	S & L	Jaw	3	"	"	R R	"	"	"	Ball	3	Ball	"	"	"	B & P
54	Commerce	96	32x3½	32x3½	"	"	Tube	.....	.....	Frict	Any	"	"	"	Semi-F	Int	.....	Plain	3					
55	Cortland, ¾-ton	88	..x2	..x2	.....	Plat	Square	.....	.....	Plan	2	Amid	"	"	Dead	"	.....	"	2	.....	Ball	Ball	Plain	Ball
56	Cortland, 1½-ton	104	..x3	..x3½	.....	.....	.....	.....	.....	"	.....	"	"	"	"	.....	.....	"	2	.....	Roller	Roller	"	Plain
57	Couple-Gear, H-C	144	..x3½	..x3½*	½ El	½ El	Bridge	.....	.....	Elec	Any	.....	Elect	.....	.....	.....	Elect	"	5	.....	"	"	"	Roller
58	Couple-Gear, A-C	144	..x4*	..x4*	"	"	"	.....	.....	"	"	.....	"	.....	.....	.....	"	"	5	.....	"	"	"	"
59	Crawford, 12-30	115	34x4	34x4	"	El	I B	Cone	Leath	Sel	3	R A	Shaft	T T	Float	Ext	Int	"	3	B & R	Ball	"	"	Plain
60	Crown, A	104	36x3	36x3	"	"	Square	M D	Steel	Jaw	3	Amid	Chain	R R	Dead	Jack	Ext	"	3	Ball	"	Ball	Ball	Ball
61	Dart, E-E	80	36x..	36x..	El	"	Solid	Cone	Fiber	Plan	2	.....	"	"	"	"	Int	"	.....	Plain	"	.....	.....	Plain
62	Day Utility, B	110	32x3½	32x3½	½ El	½ El	I B	M D	S & B	Sel	3	U M	Shaft	Springs	Semi-F	Int	Ext	"	3	"	"	Roller	"	Ball
63	Denniston	94	Opt	Opt	"	½ El	.....	.....	.....	"	3	.....	.....	.....	.....	Trans	Int	"	2	Ball	.....	.....	.....	.....
64	Detroit Motor Wagon, A	100	32x2	32x2½	"	El	Tube	M D	S & F	Plan	2	Jack	Chain	R R	Dead	Jack	.....	"	2	.....	Ball	Roller	Ball	.....
65	Dispatch, I	96	36x3	36x3	El	"	"	"	F & I	Frict	Any	Amid	"	RR&S	"	Int	Trans	"	3	Roller	Roller	"	Plain	Ball
66	Dispatch, Express	120	36x3½	36x3½	"	"	"	"	"	Sel	"	"	"	"	"	"	"	"	5	"	"	"	"	"
67	Dorris, G	132	34x4	34x4	½ El	Plat	I B	"	Ray	Sel	3	U M	Shaft	TR&S	Float	"	Ext	"	3	"	"	"	"	"
68	Dorris, G	138	34x3½	36x3*	"	½ El	"	"	S & R	"	3	"	Chain	R R	Dead	Jack	Int	"	3	"	"	"	Roller	"
69	Durable Dayton, H	120	36x4	36x4	"	Plat	"	"	S & B	"	3	.....	"	"	"	"	.....	"	3	.....	"	"	"	"
70	Durable Dayton, K	136	36x5	36x4*	"	"	"	"	"	"	3	Jack	"	"	"	"	Int	"	3	Roller	"	Roller	"	"
71	Durable Dayton, M	150	36x5	42x5*	"	¾ Plat	"	"	"	"	3	.....	"	"	"	"	.....	"	3	.....	"	.....	"	"
72	Duryea, Delivery	84	38x1½	42x1½	¼ El	½ El	Chan	Roller	Steel	.....	2	R A	Roller	T R	.....	.....	.....	"	4	Roller	Ball	Ball	Plain	Plain
73	Evans, I	112	33x4	33x4	½ El	½ El	I B	Cone	S & L	Sel	3	Amid	Shaft	T T	Semi-F	Int	Ext	"	2	Plain	"	"	"	"
74	Federal, C	110	36x3½	36x4	"	½ El	"	"	L & I	"	3	Jack	Chain	R R	Dead	Jack	Int	"	3	Roller	Roller	Roller	"	"
75	Federal, D	144	36x3½	36x4	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
76	Ford	100	30x3	30x3½	Cross	Cross	"	M D	Steel	Plan	2	U M	Shaft	T T	Semi-F	Int	.....	"	3	Plain	Ball	.....	"	"
77	Franklin, L-5	94	36x5½	36x5½	El	½ El	Tube	"	S & B	Prog	3	Amid	"	Springs	"	Trans	Ext	"	5	Ball	Roller	B & R	Plain	B & P
78	Franklin, L-5	94	36x5½	36x5½	"	"	"	"	"	"	3	"	Worm	"	"	Jack	"	"	5	"	"	"	"	"
79	Franklin, K-6	100	30x4	30x4	"	El	"	"	"	Sel	3	"	Shaft	"	"	"	"	"	5	"	"	Ball	"	"
80	Franklin, O-1	122	36x4½	36x4½	"	"	"	"	"	"	3	"	"	"	"	"	"	"	5	"	"	B & R	"	"
81	Frontenac	118	36x4	36x3*	½ El	½ El	I B	Cone	L, C & I	"	3	"	Chain	R R	Dead	"	Int	"	3	Roller	"	Roller	Roller	Plain
82	Frontenac, F	118	36x5	36x4*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
83	F-S	90	32x1½	32x1½	"	El	"	M D	R & S	Prog	2	U M	Shaft	T T	Semi-F	Int	"	"	2	Plain	Ball	"	Plain	"
84	F-S	115	34x3½	34x3½	"	½ El	Tube	.....	.....	Frict	Any	Amid	Chain	R R	Dead	Jack	Ext	"	3	"	"	Ball	"	"
85	F-S	120	36x5	36x4*	"	"	Solid	M D	Steel	Sel	4	U M	"	"	"	"	Int	"	3	P & R	"	"	"	"
86	Garford, D	120	36x6	40x6*	"	"	Rect	Cone	L, C & I	"	4	Amid	"	"	"	Trans	"	"	3	Ball	Roller	Roller	Ball	Ball
87	Geneva, B	96	34x2	36x2½	"	El	Solid	M D	S & L	Plan	2	Jack	"	"	"	Int	.....	"	2	"	Ball	Ball	Plain	.....
88	Geneva, C	96	34x2	36x2½	"	"	"	"	"	"	2	"	"	"	"	"	.....	"	2	"	"	"	.....	.....
89	Glide	120	36x4½	40x4	"	½ El	I B	"	Steel	Sel	3	R A	Shaft	T T	Semi-F	Ext	Int	"	5	Roller	Roller	Roller	B & P	Plain
90	G-M-C, V	126	34x3	36x4	"	"	"	"	S & A	"	4	Jack	Chain	R R	Dead	"	"	"	3	Ball	"	"	Roller	"
91	G-M-C, S	142	34x4	36x3½*	"	"	"	"	"	"	4	"	"	"	"	"	"	"	3	"	"	"	"	"

NOTE—*Tires are dual. Abbreviations: Clutch: M. D., multiple disk; Con., contracting band; Exp., expanding band. Friction surface: Lin., linobestos; Ther., thermoid; A., asbestos; F., fiber; B., bronze; Leath., leather; S., steel; C., cork inserts; Cp., copper. Gearset location: Amid., amidship; U. M., in unit with the motor; Jack, on jackshaft; R. A., on the rear axle. Drive: Worm, shaft with worm gear. Car drives through: T. T., torsion tube; R. R., radius rod; T. R., torsion rods; S., springs. Brakes: Jack, on jackshaft; Int., internal expanding on rear hubs; Ext., external contracting on rear hubs; Trans., on transmission. Springs: El., elliptic; Plat., platform. Front axle: I. B., I-beam; Chan., channel.

MOTOR AGE

Motor Specifications of Commercial Cars Made by American Manufacturers for 1912

No.	NAME AND MODEL	BODY	Weight	Price	Load Platform in Feet	Total Length in Feet	No. Cyl.	Bore	Stroke	H. P. S.A.E.	Piston Disp.	Cylinder Type	Cylinder, How Cast	Valve Location	COOLING		IGNITION			CARBURETER		Motor Lubr.
															Circulation	Radiator	System	Magneto	Control	Design	Fuel Feed	
92	G-M-C, H	Optional	7,000	3,500	14x5.3	18.3	4	5.00	5.00	40.0	392.7	L-Head	Pairs	Lt. Side	Pump	Cell	Double	Mea	Gov.	Schebler	Gravity	Splash
93	G-M-C, K	"	10,000	4,400	14.2x5.3	18.3	4	5.00	5.00	40.0	392.7	"	"	"	"	"	"	"	"	"	"	"
94	Grabowsky, 1-ton	"	2,000	.....	8x4	.....	4	4.25	4.50	28.9	255.3	"	"	Rt. Side	"	"	Dual	Bosch	Gov.	.....	"	"
95	Grabowsky, 1½-ton	"	3,000	.....	11x5.5	.....	4	4.25	4.50	28.9	255.3	"	"	"	"	"	"	"	"	.....	"	"
96	Grabowsky, 2-ton	"	4,000	.....	11x5.5	.....	4	4.25	4.50	28.9	255.3	"	"	"	"	"	"	"	"	.....	"	"
97	Grabowsky, 3-ton	"	6,000	.....	12x6	.....	4	5.00	5.00	40.0	392.7	"	"	Lt. Side	"	"	"	"	"	.....	"	"
98	Grabowsky, 5-ton	"	10,000	.....	14x6	.....	4	5.25	5.75	44.1	497.8	T-Head	"	Opposite	"	"	"	"	"	.....	"	"
99	Gramm, 1	"	2,000	2,000	9.4x4	13.5	4	4.00	5.00	25.6	251.3	L-Head	En bloc	Rt. Side	Thermal	Tube	Single	"	Fixed	Rayfield	"	"
100	Gramm, 2	"	4,000	2,600	11x4.5	14.9	4	4.25	4.50	28.9	255.3	"	Pairs	"	Pump	"	"	"	"	"	"	"
101	Gramm, 3	"	6,000	3,600	12.5x6	17.1	4	5.00	5.00	40.0	392.7	"	"	"	"	"	Dual	Optional	Hand	"	"	"
102	Gramm, 5	"	10,000	4,500	13x6	17.1	4	5.00	5.00	40.0	392.7	"	"	"	"	"	"	"	"	"	"	"
103	Great Eagle, 4-50	Ambulance	.....	3,500	.....	.....	4	4.75	5.00	36.1	354.4	"	Separate	Lt. Side	"	Cell	"	Remy	.....	Stromberg	.....	.....
104	Hart-Kraft, B	Delivery	1,000	1,175	5.5x4	.....	2	4.50	4.00	16.2	127.3	"	"	Side	Thermal	Tube	"	Optional	Hand	Schebler	Gravity	Splash
105	Hart-Kraft, B	"	1,500	1,250	6.3x4	.....	2	4.50	4.00	16.2	127.3	"	"	"	"	"	"	"	"	"	"	"
106	Hart-Kraft, E	Optional	2,000	2,000	7.2x3.5	14.5	4	4.13	5.25	27.3	280.6	"	En bloc	"	Pump	"	"	"	"	"	"	Forced
107	Hart-Kraft, C	"	3,000	2,500	7.9x3.5	15.5	4	4.13	5.25	27.3	280.6	"	"	"	"	"	"	"	"	"	"	"
108	Hart-Kraft, D	"	5,000	3,000	10x5	18.0	4	4.50	5.50	32.4	349.9	"	Pairs	"	"	"	"	"	"	"	"	"
109	Hart-Kraft, G	"	.....	1,800	.....	.....	4	3.75	5.25	22.5	231.9	"	En bloc	"	"	"	"	Optional	.....	"	"	"
110	Hart-Kraft, H	"	.....	2,750	.....	.....	4	4.13	5.25	27.3	280.6	"	"	"	"	"	"	"	.....	"	"	"
111	Hart-Kraft, F	"	.....	3,400	.....	.....	4	4.50	5.50	32.4	349.9	"	Pairs	"	"	"	"	"	.....	"	"	"
112	Hatfield, G	"	1,000	850	6x3.6	10.5	3	4.13	4.00	.....	160.5	2-Cycle	Separate	.....	Air	.....	Single	Bosch	Fixed	Holley	Gravity	In Fuel
113	Hatfield, H	"	2,000	1,200	7x4	11.5	3	4.13	4.00	.....	160.5	"	"	"	"	"	"	"	"	"	"	"
114	Herreshoff	Delivery	.....	950	.....	.....	4	3.38	3.75	18.3	134.2	L-Head	En bloc	Lt. Side	Thermal	Tube	"	Optional	"	Stromberg	"	Splash
115	Hupmobile	"	.....	850	.....	.....	4	3.25	3.38	16.9	112.0	"	Pairs	"	"	"	Single	Bosch	"	Breeze	Gravity	"
116	Ideal, H	Express	1,500	1,500	8.5x3.6	13.8	4	3.50	4.25	19.6	163.5	"	"	"	"	"	"	"	Hand	Optional	"	Forced
117	Ideal, I	Express or Stake	2,000	1,750	9x3.6	14.3	4	3.50	4.25	19.6	163.5	"	"	"	"	"	Dual	"	"	"	"	"
118	Ideal, G	Platform	2,000	2,200	10x5.3	15.3	4	4.13	5.25	27.3	280.6	"	En bloc	"	Pump	"	Double	"	"	"	"	"
119	Indiana, A	Express or Stake	3,000	2,000	9.5x5	16.0	4	4.00	4.00	35.6	201.1	"	Separate	Side	"	"	Single	"	Fixed	.....	"	Splash
120	International, G	Delivery	1,000	.....	.....	.....	2	5.00	5.00	20.0	196.3	I-Type	"	Head	Air	.....	Dual	"	Hand	Schebler	"	Forced
121	Jackson, 36	Panel top	1,200	1,200	5.5x3.5	15.0	4	4.25	4.50	28.9	255.3	L-Head	Pairs	Lt. Side	Thermal	Cell	"	Splitdorf	"	"	"	Splash
122	Johnson, A	Express or Stake	2,000	2,000	9.4x4	13.8	4	4.25	4.50	28.9	255.3	"	"	Side	Pump	"	"	Bosch	Gov.	Stromberg	"	Forced
123	Johnson, B	"	4,000	2,000	10.8x4.4	15.0	4	4.50	5.25	32.4	334.0	"	"	"	"	"	"	"	"	"	"	"
124	Johnson, C	"	8,000	3,200	12.8x5.3	17.5	4	5.00	5.50	40.0	431.9	"	"	"	"	"	"	"	"	"	"	"
125	Jons, B	Delivery	.....	750	.....	.....	3	3.75	4.25	.....	140.8	2-Cycle	Separate	.....	Thermal	Tube	"	"	Hand	Own	"	Splash
126	Jons, B	"	1,000	800	.....	.....	3	3.75	4.25	.....	140.8	"	"	.....	Pump	Cell	"	Briggs	"	Schebler	"	Forced
127	Jons	"	1,000	1,150	.....	.....	3	3.75	4.00	.....	132.5	"	"	.....	.....	.....	.....	.....	.....	.....	.....	.....
128	Jons, 3-ton	Optional	6,000	3,500	.....	.....	4	4.50	5.50	32.4	349.9	L-Head	Pairs	Lt. Side	Pump	Cell	Dual	Bosch	Hand	Schebler	Pressure	Splash
129	Juno, E-2	"	4,000	2,650	11.5x5	16.0	4	4.25	5.00	82.9	283.6	T-Head	"	Opposite	"	Tube	"	Optional	"	Stromberg	Gravity	Forced
130	Juno, F-3	"	6,000	3,250	13.5x5.5	18.0	4	4.75	5.50	36.1	389.9	"	"	"	"	"	"	"	"	"	"	"
131	Kato, H	Stake	6,000	3,500	12x6	15.5	4	4.75	5.00	36.1	354.4	L-Head	"	Side	"	"	Single	Remy	"	Schebler	"	Splash
132	Kearns, B	Express	1,500	1,075	6x3.5	10.5	3	4.00	4.00	.....	150.8	2-Cycle	Separate	.....	Air	.....	"	.....	"	"	"	In Fuel
132a	Kelly, 1-ton	Optional	2,000	.....	9x3.9-4.5	16	4	4.38	5.13	30.6	308.2	L-Head	"	Opposite	.....	.....	"	Eisemann	.....	Breeze	"	Splash
132b	Kelly, 2-ton	"	4,000	.....	.....	.....	4	4.38	5.13	30.6	308.2	"	"	"	.....	.....	"	"	.....	"	"	"
132c	Kelly, 3-ton	"	6,000	.....	12.5x4-5.5	17	4	4.38	5.13	30.6	308.2	"	"	"	.....	.....	"	.....	.....	"	"	"
133	*Kelsey, L	Delivery	250	.....	.....	.....	2	3.25	3.75	.....	62.2	2-Cycle	"	.....	Thermal	Tube	"	.....	.....	Own	"	"
134	*Kelsey, N	"	500	.....	.....	.....	2	3.25	3.75	.....	62.2	"	"	.....	"	"	"	.....	.....	"	"	"
135	Kisselkar, C	Optional	1,500	1,500	6.8x3.7	14.0	4	4.25	4.25	28.9	241.1	L-Head	Pairs	Lt. Side	Pump	Cell	Dual	Optional	Hand	Stromberg	Gravity	Splash
136	Kisselkar, E	"	2,000	2,250	8x5	15.0	4	4.50	4.75	32.4	302.2	"	"	"	"	"	"	"	"	"	"	"
137	Kisselkar, B	Express	4,000	2,900	10x5	18.0	4	4.50	4.75	32.4	302.2	"	"	"	"	"	"	Bosch	"	"	"	"
138	Kisselkar, A	Optional	6,000	3,350	12.4x6	19.4	4	4.88	5.00	38.0	373.3	"	"	"	"	"	"	"	"	"	"	"
139	Kisselkar, 4-ton	"	8,000	3,650	14x6	21.0	4	4.88	5.00	38.0	373.3	"	"	"	"	"	"	Optional	"	"	"	"
140	Kisselkar, D	"	10,000	4,350	14x6.5	22.0	4	4.88	5.00	38.0	373.3	"	"	"	"	"	"	"	"	"	"	"
141	Klinekar, 2-16	"	1,250	1,250	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	Thermal	.....	.....	.....	.....	.....	.....	Forced
142	Kopp, H	Platform	3,000	2,500	.....	.....	4	4.25	4.50	38.9	255.3	T-Head	Pairs	Opposite	Pump	Cell	Double	Bosch	Hand	Optional	Gravity	"
143	Kopp, L	Optional	6,000	.....	11.5x6	16.0	4	4.88	5.50	38.0	410.6	"	"	"	"	"	"	"	"	Schebler	"	"
144	Kopp, M	"	10,000	.....	13.5x6	17.0	4	5.25	6.00	44.1	519.5	"	Separate	"	"	"	"	"	"	"	"	"
145	Knox, R-5	Platform	4,000	.....	10x5	.....	4	5.00	4.75	40.0	373.0	I-Type	"	Head	"	Tube	"	"	"	Stromberg	"	"
146	Knox, R-7	"	4,000	.....	12x5	.....	4	5.00	4.75	40.0	373.0	"	"	"	"	"	"	"	"	"	"	"
147	Knox, R-3	Optional	4,000	3,000	11x5	.....	4	5.00	4.75	40.0	373.0	"	"	"	"	"	"	"	"	"	"	"
148	Knox, R-15	"	6,000	3,700	12x6	.....	4	5.00	4.75	40.0	373.0	"	"	"	"	"	"	"	"	"	"	"
149	Knox, R-16	"	8,000	4,000	14x6	.....	4	5.00	4.75	40.0	373.0	"	"	"	"	"	"	"	"	"	"	"
150	Knox, M-17	"	10,000	4,500	14.5x6	.....	4	5.50	5.50	48.4	522.7	"	"	"	"	"	"	"	"	"	"	"
151	Knox, M-18	"	12,000	5,000	.....	.....	4	5.50	5.50	48.4	522.7	"	"	"	"	"	"	"	"	"	"	"

NOTE—Where body is optional, price usually refers to chassis alone. Abbreviations: Thermal, thermo-syphon circulation; Tube., tubular radiator; Cell., cellular or honeycomb radiator. Bore and stroke are given in decimals to the nearest 1-100th inch: as, 4.50=4½, etc., .06=1-16, .13=⅛, .19=3-16, .25=¼, .31=5-16, .38=⅜, .44=7-16, .50=½, .56=9-16, .63=⅝, .69=11-16, .75=¾, .81=13-16, .88=⅞, .94=15-16, 1=1.00. *Three-wheeled vehicle.

Transmission and Running Gear Specifications of American Commercial Cars for 1912

Table No.	NAME AND MODEL	RUNNING GEAR							TRANSMISSION								BEARINGS						
		Wheel Base	TIRES		SPRINGS		Front Axle	CLUTCH		GEARSET			Drive	Car Drives Through	Rear Axle	BRAKES		CRANKSHAFT		Gearset	Front Wheel	Rear Axle	Steering Knuckle	Steering Gear
			Front	Rear	Front	Rear		Type	Friction Surface	Type	No. Speeds	Location				Serv.	Em.	Type	No.					
92	G-M-C, H.	138	36x5	36x4*	½ El	½ El	I B	M D	S & B	Prog	3	Jack	Chain	R R	Dead	Jack	Ext	Plain	3	Ball	Roller	Roller	Roller	Plain
93	G-M-C, K	138	36x6	36x5*	"	"	"	"	S & R	"	3	"	"	"	"	"	"	"	3	"	"	"	Plain	"
94	Grabowsky, 1-ton.	121	34x3½	34x4	"	Plat	"	"		Sel	3	U M	"	"	"	"	Int	"	3	"	"	"	"	"
95	Grabowsky, 1½-ton	145	36x4	36x4	"	"	"	"	"	"	3	"	"	"	"	Trans	"	"	3	Roller	"	"	"	"
96	Grabowsky, 2-ton	145	36x4	36x3½*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
97	Grabowsky, 3-ton	145	36x5	40x4*	"	½ El	"	"	"	"	3	"	"	"	"	Jack	"	"	3	"	"	"	Roller	"
98	Grabowsky, 5-ton	156	38x6	42x6	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	P & R	"
99	Gramm, 1	106	34x3½	34x3½	"	"	Square	"	Steel	"	3	Amid	"	"	"	"	"	"	2	"	"	"	Roller	.....
100	Gramm, 2	116½	36x4	36x3*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	.....	.....
101	Gramm, 3	124	36x5	36x4*	"	"	"	"	"	"	4	"	"	"	"	"	"	"	3	"	"	"	.....	.....
102	Gramm, 5	130	36x5	40x5*	"	"	"	"	"	"	4	"	"	"	"	"	"	"	3	"	"	"	.....	.....
103	Great Eagle, 4-50	135	36x4½	36x4½	.....	.....	I B	Cone	.....	"	3	"	Shaft	.....	Float	Ext	"	.....	.....	.....	"	Roller	.....	.....
104	Hart-Kraft, B.	90	34x2½	34x2½	El	El	Rect	M D	Steel	Plan	2	U M	Chain	R R	Dead	"	.....	Ball	2	Roller	Ball	Ball	Plain	Ball
105	Hart-Kraft, B	95	34x3	34x3	"	"	"	"	"	"	2	"	"	"	"	"	.....	"	2	"	"	"	"	"
106	Hart-Kraft, E.	120	34x3½	36x4	"	Plat	"	Cone	L & I	Sel	3	Amid	"	"	"	"	Jack	Plain	3	Ball	"	"	Ball	"
107	Hart-Kraft, C	127	34x3½	36x5	½ El	½ El	"	M D	S & B	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
108	Hart-Kraft, D.	144	34x4	38x3½*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
109	Hart-Kraft, G.	116	34x..	34x..	El	El	Solid	Cone	Leath	"	3	"	"	"	"	"	"	"	.....	"	"	"	.....	"
110	Hart-Kraft, H	130	34x..	36x..	½ El	½ El	"	M D	S & B	"	3	"	"	"	"	"	"	"	.....	"	"	"	.....	"
111	Hart-Kraft, F	148	34x..	38x..	"	"	"	"	"	"	3	"	"	"	"	"	"	"	.....	"	"	"	.....	"
112	Hatfield, G	88	34x2	34x2	"	"	I B	.....	.....	Frict	Any	"	"	"	"	Jack	.....	"	5	Roller	Plain	Roller	.....	.....
113	Hatfield, H	96	34x2½	34x3	"	"	"	.....	.....	"	"	"	"	"	.....	Ext	Ext	"	5	"	"	"	.....	.....
114	Herreshoff	100	32x3	32x3	"	"	"	M D	Steel	Sel	3	"	Shaft	T T	Semi-F	Trans	Int	"	2	Plain	Ball	"	.....	.....
115	Hupmobile	110	30x3	31x3½	"	Cross	"	"	"	"	2	U M	"	"	"	Int	"	"	3	"	Roller	"	Roller	Plain
116	Ideal, H	106	36x2½	36x3	½ El	½ Plat	Solid	Spec	S & T	"	3	Jack	Chain	R R	Dead	Jack	Int	"	3	Ball	Ball	Ball	Ball	"
117	Ideal, I.	115	36x3	36x3½	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	Roller	Roller	Roller	"
118	Ideal, G	124	36x3½	36x4	½ El	"	"	Cone	Leath	"	3	"	"	"	"	"	"	"	3	"	Ball	Ball	Ball	"
119	Indiana, A.	120	34x3	34x4	"	½ El	I B	M D	Steel	"	3	"	"	"	"	"	.....	.....	.....	.....	Roller	Roller	"	.....
120	International, G	84	..x1½	..x1¼	El	El	Square	C B	I & F	Clutch	2	Amid	"	"	"	Int	Ext	Plain	2	Plain	P & R	P & R	Plain	Plain
121	Jackson, 36	115	33x4	33x4	"	"	I B	M D	Iron	Sel	3	U M	Shaft	"	Semi-F	.....	.....	"	3	Ball	Ball	B & R	"	Ball
122	Johnson, A	100	34x3½	34x3½	½ El	½ El	"	Cone	S & L	"	3	Amid	Chain	"	Dead	Jack	Int	"	3	"	Plain	Plain	"	B & P
123	Johnson, B	108	36x4	36x4	"	"	"	"	L & I	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
124	Johnson, C.	132	36x5	36x3½*	"	"	Round	"	"	"	3	"	"	"	"	Int	"	"	3	"	"	"	"	"
125	Jons, B	96	32x3½	32x3½	"	½ El	I B	M D	S & R	"	3	R A	Shaft	T T	Semi-F	.....	.....	"	4	Roller	Ball	Roller	.....	.....
126	Jons, B	96	32x3½	32x3½	"	"	"	"	"	"	3	"	"	"	"	.....	.....	"	4	"	"	"	.....	.....
127	Jons	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
128	Jons, 3-ton	130	36x4	36x5	½ El	½ El	I B	M D	R & S	Sel	3	U M	Chain	R R	Dead	Int	.....	Plain	3	Roller	Ball	.....	Ball	Ball
129	Juno, E-2	132	36x4	36x3*	"	Plat	Square	"	Steel	"	3	Jack	"	"	"	Jack	Int	"	3	Ball	"	Ball	"	"
130	Juno, F-3.	143	36x5	36x4*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
131	Kato, H	120	34x5	34x5	"	"	I B	Cone	L & I	"	3	Amid	Shaft	T T&R	Float	Int	"	"	3	Roller	B & R	B & R	Plain	Plain
132	Kearns, B.	100	34x2	34x2	El	El	Square	.....	.....	Frict	Any	"	Chain	R R	Dead	I & E	.....	"	4	.....	Ball	Ball	Ball	Ball
132a	Kelly, 1-ton	120	36x3½	36x4	½ El	½ El	I B	Cone	L & I	Sel	3	"	"	"	Dead	Int	Int	"	3	Roller	Roller	Roller	Plain	B & P
132b	Kelly, 2-ton	136	36x4	38x5	"	"	"	"	"	"	4	"	"	"	"	.....	.....	"	3	Ball	"	"	Roller	Ball
132c	Kelly, 3-ton	136	36x4	38x4*	"	"	"	"	"	"	4	"	"	"	Square	.....	.....	"	3	"	"	"	"	"
133	Kelsey, L.	74	28x3	28x3	"	Spec	.....	.....	.....	Plan	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
134	Kelsey, N	74	28x3	29x3½	"	"	.....	.....	.....	"	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
135	Kisselkar, C	120	35x4½	35x4½	½ El	½ El	I B	Cone	Leath	Sel	3	Amid	Shaft	Springs	Float	Ext	.....	Plain	3	Ball	Roller	Roller	Plain	Plain
136	Kisselkar, E	132	37x5	37x5	"	"	"	"	"	"	4	"	"	"	"	"	Int	"	3	"	"	"	"	"
137	Kisselkar, B	140	34x4	36x3½*	"	"	"	"	"	"	4	"	Chain	R R	Dead	Jack	"	"	3	"	"	"	Roller	.....
130	Kisselkar, A	144	36x4	36x4*	"	"	"	"	"	"	4	"	"	"	"	"	"	"	3	"	"	"	.....	.....
139	Kisselkar, 4-ton	156	36x5	36x5*	"	"	"	"	"	"	4	"	"	"	"	"	"	"	3	Roller	"	"	"	Plain
140	Kisselkar, D.	156	36x5	40x6*	"	"	"	"	"	"	4	"	"	"	"	"	"	"	3	"	"	"	"	"
141	Klinekar, 2-16	86	36x3	36x3	"	El	Square	.....	.....	Plan	2	.....	"	"	Square	.....	.....	.....	3	.....	.....	.....	.....	.....
142	Kopp, H.	120	36x4	36x5	El	"	Solid	M D	S & B	Jaw	3	Amid	"	"	Dead	Int	Ext	Plain	3	Ball	Roller	Roller	.....	Ball
143	Kopp, L.	116	36x5	36x4	.....	.....	I B	Opt	.....	Sel	3	"	"	"	"	"	Jack	"	3	Roller	"	"	Roller	"
144	Kopp, M	126	36x6	36x5	.....	.....	"	"	.....	"	3	"	"	"	"	"	"	"	5	"	"	"	"	"
145	Knox, R-5	103	34x4	34x3½*	½ El	½ El	"	M D	I & C	"	3	U M	"	"	"	Trans	Int	"	5	Ball	"	Ball	"	B & P
146	Knox, R-7	125	34x4	34x3½*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	5	"	"	Roller	"	"
147	Knox, R-3	145	34x4	34x4*	"	½ El	"	"	"	"	3	"	"	"	"	Jack	"	"	5	"	"	"	"	"
148	Knox, R-15	149	36x5	36x5*	"	½ El	"	"	"	"	3	Amid	"	"	"	"	"	"	5	Roller	"	"	"	"
149	Knox, R-16	149	36x6	36x6*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	5	"	"	"	"	"
150	Knox, M-17.	149	36x6	36x6*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	5	"	"	"	"	"
151	Knox, M-18.	149	36x6	42x6*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	5	"	"	"	"	"

NOTE—*Tires are dual. Abbreviations: Clutch: M. D., multiple disk: Con., contracting band; Exp., expanding band. Friction surface: Lin., linobestos; Ther., thermoid; A., asbestos; F., fiber; B., bronze; Leath., leather; S., steel; C., cork inserts; Cp., cop per. Gearset location: Amid., amidship; U. M., in unit with the motor; Jack, on jackshaft; R. A., on the rear axle. Drive: Worm, shaft with worm gear. Car drives through: T. T., torsion tube; R. R., radius rod; T. R., torsion rods; S., springs. Brakes: Jack, on jackshaft; Int., internal expanding on rear hubs; Ext., external contracting on rear hubs; Trans., on transmission. Springs: El., elliptic; Plat., platform. Front axle: I. B., I-beam; Chan., channel.

Motor Specifications of Commercial Cars Made by American Manufacturers for 1912

No.	NAME AND MODEL	BODY	Weight	Price	Load Platform in Feet	Total Length in Feet	No. Cyl.	Bore	Stroke	H. P. S.A.E.	Piston Disp.	Cylinder Type	Cylinder, How Cast	Valve Location	COOLING		IGNITION			CARBURETER		Motor Lubr.
															Circulation	Radiator	System	Magneto	Control	Design	Fuel Feed	
152	Knox, R-64	Ambulance		3,900			4	5.00	4.75	40.0	373.0	I-Type	Separate	Head	Pump	Tube	Double	Bosch	Hand	Stromberg	Gravity	Forced
153	Knox, M-3	Fire Combination		5,600			4	5.50	5.50	48.4	522.7	"	"	"	"	"	"	"	"	"	"	"
154	Knox, M-4	" "		5,500			4	5.50	5.50	48.4	522.7	"	"	"	"	"	"	"	"	"	"	"
155	Knox, 8			9,000			6	5.00	5.50	60.0	647.8	"	"	"	"	"	"	"	"	"	"	"
156	Knox, 9	"		11,000			6	6.50	7.50	100.5	1494.0	"	"	"	"	"	"	"	"	"	"	"
157	Knox	Tractor.	16,000	2,750			4	5.00	4.88	40.0	382.9	"	"	"	"	"	"	"	"	"	"	"
158	Lambert, ½-ton	Platform	1,000	1,175			2	5.25	4.00	22.0	173.1							Remy		Breeze		Splash
159	Lambert, 1-ton	Ex. or Platform.	2,000	1,600	7.5x4	15.5	4	4.13	4.50	27.3	240.5	L-Head	En bloc	Lt. Side	Pump	Tube	Dual	"	Hand	Schebler	Gravity	"
160	Lambert, 2-ton	"	4,000	2,000	9x5	19.5	4	4.13	4.50	27.3	240.5	"	"	"	"	"	"	"	"	"	"	"
161	Lambert, 3-ton	Platform	6,000	3,000			4	5.00	6.50	40.0	510.5		Pairs		"			"				"
162	Landshaft, A-B	Delivery	1,000	950	7x3.5		2	5.00	4.75	20.0	186.5	L-Head	Separate	Side	Thermal	Tube	Single		Hand	Raymond	Gravity	Forced
163	Landshaft, C-D	"	2,000	1,250 & 1,300	8x3.5		2	5.00	5.00	20.0	196.3	"	"	"	"	"	"		"	"	"	"
164	Lauth-Juergens, G	Express	2,000	1,950	10x4	14.5	4	4.00	4.00	25.6	201.1	"	"	"	Pump	Cell	Double	Bosch	"	Rayfield	"	Splash
165	Lauth Juergens, F	"	2,000	1,650	10x4	14.5	2	5.00	5.00	20.0	196.3	"	"	"	Thermal	"	Dual	"	"	Schebler	"	Forced
166	Lauth-Juergens, H	Platform	4,000	2,700	13x5.5	16.9	4	4.50	5.00	32.4	318.1	"	"	"	Pump	"	Double	"	"	Rayfield	"	Splash
167	Lauth-Juergens, I	Platform	6,000	3,350	14x5.5	16.9	4	4.75	5.00	36.1	354.4	"	"	"	"	"	"	Optional	"	"	"	"
168	LeMoon, B	Express	2,000	2,000	8x4	16.5	4	4.00	4.00	35.6	201.1	"	"	"	"	Tube	Single	Bosch	Fixed	"	"	"
169	LeMoon, A	"	3,000	2,500	10x4-5.5	17.5	4	4.50	5.00	32.4	318.1	"	"	"	"	"	"	"	Hand	"	"	"
170	Lincoln, 27-29	"	800	650 & 785	5.5x3.2	12.0	2	4.13	4.00	13.6	103.6	"	En bloc	Hd. & Side	Air		"		"	Schebler	"	Forced
171	Lippard-Stew't, E-S	Express or Plat	1,500	1,650	6.5x3.8 or 5	14.0	4	3.38	4.31	18.3	154.1	"	"	Side	Thermal	Cell	"	Bosch	Fixed	Own	"	Splash
172	Lippard-Stew't, P	Panel	1,500	1,675	6.1x3.7	13.5	4	3.38	4.31	18.3	154.1	"	"	"	"	"	"	"	"	"	"	"
173	Little Giant, C	Optional.	2,000	1,050	7.5x3.6		2	5.00	4.00	20.0	157.0	L-Head	Separate	Hd.& Side	"	Tube	"	Optional		Schebler	"	Forced
174	Locomobile, 5-ton	"	10,000	4,500			4	5.00	6.00	40.0	471.2	T-Head	Pairs	Opposite	Pump	Cell	Dual	Bosch	Fixed	Own	"	Splash
175	Longest, 3-A		8,000	3,500	12x6	22.0	4	5.00	5.50	40.0	431.9	"	"	"	"	Tube	Double		Gov	Stromberg	"	"
176	Lord Balt., A-12	"	6,000	3,250			4	4.13	5.25	27.3	280.6	L-Head	"	Lt. Side	"	"	Dual	Bosch	Hand	Rayfield	"	Forced
177	Lozier, 25	"	10,000		12.6x6	18.5	4	4.25	6.50	28.9	368.8	"	"	"	Optional	"	"	"	Gov		"	Splash
178	Mack, 1-ton	"	2,000	2,500	Optional	16–17.8	4	4.50	5.50	32.4	349.9	"	"	Rt. Side	Pump	Cell	"		"	Stromberg	"	Forced
179	Mack, 1½-ton	"	3,000	2,750	"	16–18.8	4	4.50	5.50	32.4	349.9	"	"	"	"	"	"		"	"	"	"
180	Mack, 2-ton	"	4,000	3,000	"	16–20.3	4	4.50	5.50	32.4	349.9	"	"	"	"	"	"		"	"	"	"
181	Mack, 3-ton	"	6,000	4,000	"	17–22	4	5.50	6.00	48.4	570.2	"	"	"	"	"	Optional	Bosch	"	Optional	"	"
182	Mack, 4-ton	"	8,000	4,250	"	17–22.5	4	5.50	6.00	48.4	570.2	"	"	"	"	"	"	"	"	"	"	"
183	Mack, 5-ton	"	10,000	4,800	"	17–22.5	4	5.50	6.00	48.4	570.2	"	"	"	"	"	"	"	"	"	"	"
184	Mack, 7-ton	"	14,000	5,300	"	17–22.5	4	5.50	6.00	48.4	570.2	"	"	"	"	"	"	"	"	"	"	"
185	Mais, 1½-ton	"	3,000	2,750	"	Optional	4	4.00	5.25	25.6	263.9	T-Head	"	Opposite	"	Tube	Single	Eisemann	"	Rayfield	"	Splash
186	Mais, 2½-ton	"	5,000	3,000	"	"	4	4.00	5.25	25.6	263.9	"	"	"	"	"	"	"	"	"	"	"
187	Mais, 5-ton	"	10,000	4,500	"	"	4	4.38	6.50	30.6	390.9	"	"	"	"	"	"	"	"	"	"	"
188	Martin, J	Delivery	1,000	1,400	5x3.3		2	4.50	4.50	16.2	143.1	L-Head	Separate	Hd. & Side								Forced
189	Martin, E-F2	Delivery or Ex	1,500	1,450	6x3.5		2	4.50	5.00	16.2	159.1	"	"	"								"
190	Martin, G, G2-G4	"	1,500	1,600	6.5x3.5		2	4.50	5.00	16.2	159.1	"	"	"								"
191	Martin, G3	Hearse	1,500	1,840	7.3x3.5		2	4.50	5.00	16.2	159.1	"	"	"								"
192	Martin, H	Express	2,000	1,750	7.3x6		2	4.50	5.50	16.2	174.9	"	"	"								"
193	Martin, K-K2—K3	"	4,000	3,000	9x4		4	4.25	5.00	28.9	283.6	"	Pairs	Side								"
194	Martin, L	Platform	6,000	3,500	12x5		4	4.25	5.00	28.9	283.6	"	"	"								"
195	Maxine Tricar, E	Package Van	5,000	395		10.0	2	3.25	4.00	8.5	66.3	"	Separate	Hd.& Side	Air			Splitdorf	Fixed	Own		"
196	McIntyre, 2	Optional	800	600			2	4.13	3.75	13.6	100.2	"	"	"	Thermal	Tube	Dual					Splash
197	McIntyre, 3	"	800	800			4	3.50	3.38	19.6	129.9	"	"	"	"	"	"	Bosch				"
198	McIntyre, 7	"	1,500	950			2	5.25	4.00	22.0	173.1	"	"	"	"	"	"	Remy	Gov	Schebler	Gravity	"
199	McIntyre, 8	"	1,500	1,200			4	4.00	5.00	25.6	251.3	T-Head	"	Opposite	"	"	"	"	"	"	"	"
200	McIntyre, 14	"	2,000	1,300			2	5.25	4.75	22.0	205.6	L-Head	"	Hd. & Side	"	"	"		"	"	"	"
201	McIntyre, 15	"	2,000	1,450			4	4.13	4.75	27.3	253.9	"	Pairs	"	"	Cell	"		"	"	"	"
202	McIntyre, 21	"	3,000	1,650			4	4.13	4.75	27.3	253.9	"	"	Side	Pump	"	"	Briggs		"	"	"
203	McIntyre, 28	"	4,000	2,350			4	4.13	5.25	27.3	280.6		En bloc		Thermal	Tube			Gov			
204	McIntyre, 35	"	6,000	2,850			4	4.13	5.25	27.3	280.6	"	"	"	"	"	"	"	"	"	"	"
205	Menominee	"	1,500	1,200	6.5x3.5	13.6	4	3.75	4.50	22.5	198.8	"	Pairs	"	Pump	"	Double	Eisemann	"	"	"	"
206	Mercury, P-1	Express	1,000	750–850	7x3.5	9.0	2	4.25	4.00	14.5	113.4	"	Separate	Hd. & Side	Air		Single		Fixed	Own	"	Forced
207	Modern, B	"	1,000	1,200	9.1x4.1	15.0	4	3.75	4.50	22.5	198.8	"	En Bloc	Side	Thermal	Tube		Optional			"	Splash
208	Modern, A	"	2,000	1,600	10x4.1	16.0	4	4.31	5.00	30.9	291.1	"	"	"	Pump	Cell	Dual	"	Hand	Schebler	Gravity	"
209	Moeller, C	Optional.	6,000	3,500	12.5x6	16.9	4	4.50	5.00	32.4	318.1	"	Separate	Lt. Side	"	"	"	Bosch	"	Stromberg	"	Forced
210	Moeller, A	"	10,000	4,500	12x6	16.0	4	4.50	5.00	32.4	318.1	"	"	"	"	"	"	"	"	"	"	"
211	Moeller, B	"	10,000	4,500	14x6	19.0	4	4.50	5.00	32.4	318.1	"	"	"	"	"	"	"	"	"	"	"

NOTE—Where body is optional, price usually refers to chassis alone. Abbreviations: Thermal, thermo-syphon circulation; Tube., tubular radiator; Cell., cellular or honeycomb radiator. Bore and stroke are given in decimals to the nearest 1-100th inch: as, 4.50=4½, etc., .06=1-16, .13=⅛, .19=3-16, .25=¼, .31=5-16, .38=⅜, .44=7-16, .50=½, .56=9-16, .63=⅝, .69=11-16, .75=¾, .81=13-16, .88=⅞, .94=15-16, 1=1.00.

Transmission and Running Gear Specifications of American Commercial Cars for 1912

Transmission and Running Gear Specifications of American Commercial Cars for 1912

Table No.	NAME AND MODEL	RUNNING GEAR								TRANSMISSION								BEARINGS						
		Wheel Base	TIRES		SPRINGS		Front Axle	CLUTCH		GEARSET			Drive	Car Drives Through	Rear Axle	BRAKES		CRANKSHAFT		Gearset	Front Wheel	Rear Axle	Steering Knuckle	Steering Gear
			Front	Rear	Front	Rear		Type	Friction Surface	Type	No. Speed	Location				Serv.	Em.	Type	No.					
152	Knox, R-64	134½	38x5½	38x5½	½ El	¾ El	I B	M D	I & C	Sel	3	U M	Shaft	T&RR	Float	Ext	Ext	Plain	5	Ball	Roller	Ball	Ball	Ball
153	Knox, M-3	145	40x5½	40x5½*	"	½ El	"	"	"	"	3	Amid	Chain	R R	Dead	"	Int	"	5	"	"	Roller	Roller	Roller	B & P
154	Knox, M-4	128	40x5½	40x5½*	"	"	"	"	"	"	3	"	"	"	"	Jack	"	"	5	"	"	"	"	"	"
155	Knox, 8	170	40x5	40x4*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	5	Roller	"	"	"	"	"
156	Knox, 9	186	40x5	40x5*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	5	"	"	"	"	"	"
157	Knox		32x	32x					S & B	"	3	U M	"	"	"									
158	Lambert, ½-ton	100	38x2	38x2½	½ El	½ El	Tube			Frict	Any		"	"	Solid	Jack	Int	Plain			Ball	Ball		Plain
159	Lambert, 1-ton	120	36x3	36x3½	"	"	I B			"	"		"	"	Dead	"	"	Ball	2	Roller	Roller		Ball	"
160	Lambert, 2-ton	138	36x3½	36x4	"	"	"			"	"		"	"	"	"	"	"	2	"	"		"	Ball
161	Lambert, 3-ton	138	36x4	36x6	"	"	"			"	"		"	"	"	"	"	"				B & R		Plain
162	Landshaft, A-B	86	34x2	36x2½	"	Plat	Square	M D	Steel	Plan	2	Jack	"	"	"	Int	"	Plain	2	B & R	Ball	Ball	Plain	"
163	Landshaft, C-D	96	34x2½	36x2½	"	"	"	"	"	"	2	"	"	"	"	"	"	"	2	"	"	"	"	"
164	Lauth-Juergens, G	106	36x3½	36x4	"	½ El	I B	"	S & F	Sel	4	Amid	"	"	"	Jack	Jack	"	5	Roller	"	"	Ball	Ball
165	Lauth Juergens, F	105	32x3	32x3½	"	El	Square	"	"	"	3	"	"	"	"	"	"	"	3	Plain	"	"	"	"
166	Lauth-Juergens, H	120	36x4	36x5	"	½ El	I B	"	"	"	4	Jack	"	"	"	Int	"	"	5	Ball	"	"	"	"
167	Lauth-Juergens, I	120	38x5	38x4*	"	"	"	"	"	"	4	"	"	"	"	"	"	"	5	"	"	"	"	"
168	LeMoon, B	127	36x3	36x3½	"	"	"	"		"	3	"	"	T T	"	Jack		"	5	"	"	"	Plain	"
169	LeMoon, A	132	36x3½	36x4	"	"	"	"	Steel	"	3	"	"	"	"	"		"	5	"	"	"	Ball	"
170	Lincoln, 27-29	87	34x3½	34x3½	El	El	Square			Frict	Any	Amid	"	Springs	"			"	2		Roller	Roller	Plain	Plain
171	Lippard-Stewart, E-S	115	34x4	34x4	"	½ El	I B	M D	S & R	Sel	3	"	Shaft	T R	Float	Ext	Int	Ball	2	Ball	"	"	Roller	B & P
172	Lippard-Stewart, P	115	34x4	34x4	"	"	"	"	"	"	3	"	"	"	"	"	"	"	2	"	"	"	"	"
173	Little Giant, C	90	..x2	..x2½	¾ El	El	Solid	"	Steel	Plan	2	U M	Chain	R R	Dead	Int	Ext	Plain	2		Ball	Ball	Plain	Ball
174	Locomobile, 5-ton	140	40x6	40x6*	½ El	½ El	I B	"	"	Sel	4	Amid	"	"	"	Jack	Int	"	5	Roller	Roller	Roller	Roller	Roller
175	Longest, 3-A	Opt	..x4	..x4*	"	"	Solid	Cone	Leath	"	4	"	"	"	"	"	"	"	3					
176	Lord Baltimore, A-12	114–140	34x4	36x6			"	"	Cork	"	3	Jack	"	"	"	Int	Ext			Ball	Ball	Ball	Ball	Ball
177	Lozier, 25	134	36x5	40x5*	½ El	Plat	I B	M D	Steel	"	4	Amid	"	"	"	Jack	Int	Ball	4	"	Roller	Roller	Roller	B & P
178	Mack, 1-ton	126–138	36x4	36x2½*	"	"	"	"	S & B	"	3	"	"	"	"	"	"	Plain	3	"	"	"	"	Ball
179	Mack, 1½-ton	126–150	36x4	36x3*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
180	Mack, 2-ton	126–162	36x4	36x3½*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
181	Mack, 3-ton	129–168	36x5	36x4*	"	"	Square	Cone	L & I	"	3	"	"	"	"	"	"	"	3	"	"	"	Plain	"
182	Mack, 4-ton	129–174	36x6	36x4½*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
183	Mack, 5-ton	129–174	36x6	36x5*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
184	Mack, 7-ton	129–174	36x7	36x6*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
185	Mais, 1½-ton	119–132	36x3½	36x5	"	½ El	Tube	Exp	A & I	Prog	3	U M	Shaft	T T	Float	Ext	Ext	Ball	3	"	"	B & R	Roller	Roller
186	Mais, 2½-ton	132	36x4	36x6	"	"	"	"	"	Sel	3	"	"	"	"	"	"	"	3	"	"	"	"	"
187	Mais, 5-ton	154	36x5	42x5*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
188	Martin, J	94	34x2½	34x2½	El	El	Round	M D		Plan	2		Chain	R R	Round									
189	Martin, E-F2	94	36x2½	36x2½	"	"	"	"		"	2		"	"	"									
190	Martin, G-G2-G4	98	36x3	36x3	"	Plat	"	"		"	2		"	"	"									
191	Martin, G3	104	36x3	36x3	"	"	"	"		"	2		"	"	"									
192	Martin, H	104	36x3½	36x3½	"	"	"	"		"	2		"	"	"	Jack								
193	Martin, K-K2-K3	138	36x4	40x5	½ El	"	"	"		Sel	3		"	"	"	"								
194	Martin, L	138–154	36x4	40x3½	"	"	"	"		"	3		"	"	"	"								
195	Maxine Tricar, E	97	28x2½	28x2½		½ El							Chain											
196	McIntyre, 2	86	34x1½	34x1½	½ El	El	Square	M D		Plan		U M	"		Square	Ext						Roller		
197	McIntyre, 3	86	34x1½	34x1½	"	"	"	"		Sel	2	"	Shaft		"	"						"		
198	McIntyre, 7	96	34x1½	34x2	El	"		"		Plan	2	Jack	Chain	R R	Dead			Plain	2		Roller	"	Plain	Plain
199	McIntyre, 8	96	34x1½	34x2	"	"		"		"	2	"	"	"	"			"	2		"	"	"	"
200	McIntyre, 14	119	..x2½	..x2½			I B	"		"	2	"	"	"	"	Jack	Int	"	2			"	"	"
201	McIntyre, 15	119	..x2½	..x2½				"		"	2	"	"	"	"	"	"	"	2			"	"	"
202	McIntyre, 21	119	..x3	..x3½			Square	"	Steel	"	2	"	"	"	"	"	"	"	3		Roller	"	"	"
203	McIntyre, 28	144	34x3½	34x3*			"	Cone		Sel	3	U M	"	"	"	"	"	"	3			"	"	"
204	McIntyre, 35	144	34x4	34x4*			"	"		"	3	"	"	"	"	"	"	"	3			"	"	"
205	Menominee	112	32x3	32x3	½ El	Plat	I B	M D	Steel	"	3	"	Shaft	"	Semi-F	Int	Ext	"	3	Ball	Ball	"	"	Ball
206	Mercury, P-1	85	38x1½	40x1½	El	El	Square	Disk	S & F	Plan	2	"	Chain	"	Solid	"		"	2			Ball	"	Plain
207	Modern, B	112	32x3½	32x3½	El	½ El	I B						"	"	Dead	Jack		"	3	B & R	Roller	Roller	"	"
208	Modern, A	114–130	36x3	36x3½			"	Cone	L & I	Sel	3	Jack	"	"	"	"		"	3	"	"	"	"	"
209	Moeller, C	124	36x5	36x4*	½ El	½ El	"	M D	S & B	"	3	Amid	"	"	"	"		"	5	Roller	"	"	Roller	Roller
210	Moeller, A	110	36x5	36x5*	"	"	"	"	"	"	3	"	"	"	"	Int		"	5	"	"	"	"	Ball
211	Moeller, B	138	36x5	36x5	"	"	"	"	"	"	3	"	"	"	"	"		"	5	"	"	"	"	"

NOTE—*Tires are dual. Abbreviations: Clutch: M. D., multiple disk; Con., contracting band; Exp., expanding band. Friction surface: Lin., linobestos; Ther., thermoid; A., asbestos; F., fiber; B., bronze; Leath., leather; S., steel; C., cork inserts; Cp., copper. Gearset location: Amid., amidship; U. M., in unit with the motor; Jack, on jackshaft; R. A., on the rear axle. Drive: Worm, shaft with worm gear. Car drives through: T. T., torsion tube; R. R., radius rod; T. R., torsion rods; S., springs. Brakes: Jack, on jackshaft; Int., internal expanding on rear hubs; Ext., external contracting on rear hubs; Trans., on transmission. Springs: El., elliptic; Plat., platform. Front axle: I. B., I-beam; Chan., channel.

Motor Specifications of Commercial Cars Made by American Manufacturers for 1912

No.	NAME AND MODEL	BODY	Weight	Price	Load Platform in Feet	Total Length in Feet	No. Cyl.	Bore	Stroke	H. P. S.A.E.	Piston Disp.	Cylinder Type	Cylinder How Cast	Valve Location	COOLING		IGNITION			CARBURETER		Motor Lubr.
															Circulation	Radiator	System	Magneto	Control	Design	Fuel Feed	
212	Monitor, A.	Express	1,500	1,000	7.2x3.6	10.0	2	5.00	4.00	20.0	157.0	L-Head	En Bloc	Side	Thermal	Tube		Bosch	Gov	Schebler	Gravity	Forced
213	Monitor, B.	"	3,000	1,750	7x3.8	12.0	2	5.25	4.75	22.0	411.3	"	"	"	Pump	"	Dual	Bosch	Hand	"	"	"
214	Mora, 20.	Express & Stake	1,500	1,000	6.6x3.8	12.9	2	4.50	4.50	16.2	143.1	"	"	"	Thermal	"	"	.....	"	.....	"	"
215	Morgan, C.	Delivery & Stake	4,000	3,250	.....	.....	4	4.13	5.13	27.3	274.0	.....	En Bloc	.....	Pump	Cell	"	U. & H.	"	Mayer	"	Splash
216	Morgan, B	" "	6,000	3,750	.....	.....	4	4.63	5.00	34.3	336.0	.....	"	.....	"	"	"	"	"	"	"	Forced
217	Morgan, A	Optional.	10,000	4,750	14x6.1	18.6	4	5.00	5.00	40.0	392.7	I-Type	"	Head	"	"	Double	"	"	Excelsior	"	"
	Motorette (See Kelsey)	"																				
218	Natco, 15.	"	2,000	.....	.....	14.0	4	3.50	5.00	19.6	192.4	L-Head	"	Side	Thermal	Tube	Single	.....	Fixed	.....	"	"
219	Newark, B.	Express	1,500	1,800	6.5x3.7	14.0	4	3.56	4.75	21.2	189.4	T-Head	"	Opposite	Pump	Cell	"	Bosch	"	Optional	"	"
220	Ohio, M-N	Delivery	.....	2,000	.....	.....	4	4.50	4.75	32.4	302.2	"	Pairs	"	"	"	Dual	Splitdorf	Hand	Schebler	"	Splash
221	Old Reliable	Optional.	10,000	4,000	.....	.....	4	4.75	5.50	36.1	389.9	"	"	"	"	"	Double	Bosch	"	Optional	"	"
222	Oliver, A.	"	1,500	.....	6-7x4	13.0	2	5.00	5.00	20.0	196.3	L-Head	Separate	Side	Thermal	Tube	Single	Mea	"	Stromberg	"	Forced
223	Oliver, B	"	3,000	.....	Optional	17.1	2	5.00	5.00	20.0	196.3	"	"	"	"	"	"	"	"	"	"	"
224	Packard, 2-ton	"	4,000	3,000	10x5.6	.....	4	4.06	5.13	27.1	265.7	T-Head	Pairs	Opposite	Pump	Cell	Dual	.....	Fixed	Own	"	Splash
225	Packard, 3-ton	"	6,000	3,400	12x6	19.3	4	4.50	5.50	32.4	349.9	"	"	"	"	Tube	"	.....	Gov	"	"	"
226	Packers, D.	"	4,000	2,500	10x5	17.2	4	4.25	4.50	28.9	255.3	"	"	"	"	"	"	Splitdorf	Hand	Stromberg	"	"
227	Packers, E	"	7,000	3,400	12.5x5.5	.....	4	5.25	6.00	44.1	519.5	"	Separate	"	"	"	"	"	"	"	"	"
228	Peerless, T-C	"	10,000	4,300	12x6	21.5-19.5	4	4.50	6.50	32.4	413.5	"	Pairs	"	"	.....	"	Bosch	"	Own	"	"
229	Pierce-Arrow, 5-ton	"	10,000	4,500	12.6x7	20	4	4.88	6.00	38.0	448.0	"	"	"	"	Tube	Double	"	"	"	"	Forced
230	Plymouth, D-3	"	2,000	1,800	.....	.....	4	4.00	4.00	25.6	201.1	L-Head	"	Side	"	Cell	Dual	Splitdorf	"	Schebler	"	Splash
231	Plymouth, G-2	"	4,000	2,850	.....	.....	4	5.00	6.00	40.0	471.2	"	"	"	"	"	"	"	"	"	"	"
232	Pope-Hartford	"	6,000	3,400	12-14x6	15.6-17.6	4	4.75	5.50	36.1	389.9	I-Type	"	Head	"	Tube	"	Bosch	Gov	Own	"	Forced
233	Poss	Express	.....	850	5.5x3.1	.....	4	.....	.....	.....	.....	.....	En Bloc	.....	Thermal	.....	.....	.....	.....	.....	.....	Splash
234	Randolph, 14.	Optional.	2,000	1,850	.....	12.9	2	5.25	4.75	22.0	205.6	L-Head	Separate	Side	"	Cell	Dual	Splitdorf	Hand	Schebler	Gravity	Forced
235	Rassel, A	Express	2,000	1,700	8x3.8	13.0	4	4.00	4.50	25.6	226.2	"	Pairs	"	Pump	Tube	"	Bosch	"	Stromberg	"	Splash
236	Rassel, B	Stake	4,000	2,400	10x5	15.0	4	4.25	4.50	28.9	255.3	"	"	"	"	"	"	"	"	"	"	"
237	Rassel, C	"	6,000	3,400	12.3x5.8	17.6	4	4.63	5.25	34.3	352.8	"	"	"	"	"	"	"	"	"	"	"
238	Rassel, D	"	10,000	4,400	15x6.6	20.5	4	5.00	5.75	40.0	451.6	"	"	"	"	"	"	"	"	"	"	"
239	Regal, 30	Delivery	.....	1,000	.....	.....	4	4.13	4.00	27.3	213.8	"	"	"	Thermal	"	"	Michigan	"	Schebler	"	"
240	Reo, H	Express	1,500	.....	7x3.8	11 or 12	1	4.75	6.00	9.0	106.3	"	Separate	"	"	"	Single	.....	"	.....	"	"
241	Rogers, C.	Express	1,000	800	5x4	12.1	2	4.75	4.00	18.0	141.7	"	"	"	Air	.....	"	.....	Fixed	Kingston	"	Forced
242	Rowe, A-B	"	1,500	2,250	7.4x3.6	15.0	4	4.25	5.00	28.9	283.6	T-Head	Pairs	Opposite	Pump	Cell	Dual	.....	Hand	.....	"	"
243	Sampson	Optional	1,500	1,400	6.3x3.6	.....	2	4.75	4.75	18.0	168.3	L-Head	Separate	Side	Thermal	Tube	"	.....	"	Stromberg	"	"
244	Sampson, 1½-ton.	"	3,000	2,200	9.6x5	13.5	4	4.00	5.00	25.6	251.3	"	Pairs	"	"	"	"	.....	"	"	"	"
245	Sampson, 3-ton	"	6,000	3,400	12x5.5	17.0	4	4.50	5.50	32.4	349.9	"	"	"	"	"	"	.....	Gov	"	"	"
246	Sampson, 5-ton	"	10,000	4,750	14x6	20.0	4	5.00	5.50	40.0	431.9	"	"	"	"	"	"	.....	Hand	"	"	"
247	Sandbert, J	"	2,000	1,500	8x3.6	12.0	3	4.00	4.50	.....	169.6	2-Cycle	Separate	.....	Air	.....	Single	Bosch	Fixed	Own	"	In Fuel
248	Sandusky, C.	"	3,000	2,400	10x4.3	14.0	4	3.75	5.00	22.5	220.9	L-Head	En Bloc	Side	Pump	Tube	"	Mea	Gov	Schebler	"	Splash
249	Saurer, 4½-ton.	"	9,000	5,000	12x6	.....	4	4.38	5.50	30.6	330.7	T-Head	Pairs	Opposite	"	Cell	.....	Eisemann	Hand	Own	Pressure	Forced
250	Saurer, 6½-ton.	"	13,000	6,000	13x6	.....	4	4.38	5.50	30.6	330.7	"	"	"	"	"	.....	.....	"	"	"	"
251	Schacht, 21.	"	8,000	2,900 & 3,200	11.5x4-7	20.0	4	4.50	5.00	32.4	318.1	L-Head	En Bloc	Side	"	"	Double	Mea	"	Schebler	Gravity	"
252	Schacht, 2-ton	"	4,000	2,700	.....	10.0	4	4.50	5.00	32.4	318.1	"	"	"	"	"	"	.....	"	"	"	"
253	Schacht, D-E	Delivery	.....	975	.....	.....	2	5.13	4.50	21.0	185.6	.....	Separate	.....	Thermal	"	Dual	Splitdorf	"	"	"	"
254	Schmidt, F.	Optional.	.....	1,025	.....	.....	2	4.75	4.75	18.0	168.3	.....	"	.....	Air	.....	Double	Simms	.....	"	"	"
255	Schmidt, C.	"	.....	1,375	.....	.....	2	5.00	5.00	20.0	196.3	.....	"	.....	"	.....	"	.....	.....	"	"	"
256	Seitz	"	1,500	1,500	.....	.....	4	3.50	4.50	19.6	173.2	L-Head	Pairs	Side	Pump	Tube	Dual	Remy	Hand	"	"	"
257	Seits, 1-ton	"	2,000	2,000	.....	.....	4	4.50	4.50	32.4	286.3	"	"	"	"	"	Double	"	"	"	"	"
258	Seits, 2-ton	"	4,000	2,800	.....	.....	4	4.50	5.00	32.4	318.1	"	"	"	"	"	"	"	"	"	"	"
259	Seits, 3-ton	"	6,000	3,500	.....	.....	4	5.00	5.00	40.0	392.7	"	"	"	"	"	Dual	"	"	"	"	"
260	Seits, 5-ton	"	10,000	4,500	.....	.....	4	5.50	6.50	48.4	617.7	T-Head	"	Opposite	"	"	Double	"	"	"	"	"
261	Service, A.	Delivery	1,500	850	6x3.6	13.0	4	3.75	5.25	22.5	231.9	L-Head	En Bloc	Side	"	.....	Dual	Michigan	"	Kingston	"	Splash
262	Shelby	.....	600	700	6x4	10.0	2	4.25	5.00	14.5	141.8	.....	.....	.....	"	Tube	.....	.....	"	Schebler	"	Forced
263	Shelby, ½-ton.	Optional.	1,000	1,000	8x5	12.0	2	4.50	5.00	16.2	159.0	L-Head	.....	Side	"	"	.....	.....	"	"	"	"
264	Shelby, 5-ton.	"	10,000	3,000	14x5.5	18.0	4	4.75	5.00	36.1	354.4	"	Separate	"	"	"	Dual	Remy	"	"	"	Splash
265	Speedwell, 12-Z.	Platform	8,000	3,500	12.5x6.5	18.6	4	5.00	5.00	40.0	392.7	"	Pairs	"	"	Cell	Single	Eisemann	Gov	"	"	"
266	Speedwell, 12-Z	"	8,000	3,500	15.5x6.7	21.6	4	5.00	5.00	40.0	392.7	"	"	"	"	"	"	"	"	"	"	"
267	Speedwell, 12-X	"	12,000	4,500	15.5x6.7	21.6	4	5.00	5.00	40.0	392.7	"	"	"	"	"	"	"	"	"	Pressure	"
268	S. & S., E.	Optional.	4,000	3,000	12x6	18.0	4	4.75	5.00	36.1	354.4	"	Separate	"	"	Tube	Dual	"	"	"	Gravity	Forced
269	Standard, D	"	1,500	2,250	.....	.....	4	3.63	4.75	20.3	195.3	.....	Pairs	.....	.....	.....	.....	.....	Hand	.....	.....	Splash
270	Standard, B	"	6,000	3,400	.....	.....	4	4.25	4.50	28.9	255.3	"	"	.....	"	.....	.....	.....	"	.....	.....	"
271	Stearns, Standard	"	10,000	.....	12x6	19.0	4	4.75	6.00	36.1	425.3	L-Head	Separate	Side	.....	.....	Dual	Bosch	.....	Own	.....	"

NOTE—Where body is optional, price usually refers to chassis alone. Abbreviations: Thermal, thermo-syphon circulation; Tube., tubular radiator; Cell., cellular or honeycomb radiator. Bore and stroke are given in decimals to the nearest 1-100th inch: as, 4.50=4½, etc., .06=1-16, .13=⅛, .19=3-16, .25=¼, .31=5-16, .38=⅜, .44=7-16, .50=½, .56=9-16, .63=⅝, .69=11-16, .75=¾, .81=13-16, .88=⅞, .94=15-16, 1=1.00.

Transmission and Running Gear Specifications of American Commercial Cars for 1912

Table No.	NAME AND MODEL	RUNNING GEAR								TRANSMISSION								BEARINGS						
		Wheel Base	TIRES		SPRINGS		Front Axle	CLUTCH		GEARSET			Drive	Car Drives Through	Rear Axle	BRAKES		CRANKSHAFT		Gearset	Front Wheel	Rear Axle	Steering Knuckle	Steering Gear
			Front	Rear	Front	Rear		Type	Friction Surface	Type	No. Speeds	Location				Serv.	Em.	Type	No.					
212	Monitor, A	100	33x2½	34x3	½ El	El	I B	Cone	Steel	Plan	2	Amid	Shaft	R R	Semi-F	Int	.....	Plain	.....	Roller	Ball	Roller	Plain	Plain
213	Monitor, B	100	36x3	36x3½	"	"	"	"	.....	Sel	3	"	"	"	"	"	Ext	"	2	"	"	"	"	Ball
214	Mora, 20	94	36x2	36x2½	"	½ El	Square	M D	Steel	Plan	2	Jack	Chain	"	Dead	"	Int	"	2	Ball	"	Ball	"	Plain
215	Morgan, C	113	34x4	34x5	"	El	I B	"	S & Cp	Sel	3	Amid	"	"	"	Jack	"	"	.....	"	Roller	"	.....	"
216	Morgan, B	127	34x5	34x4*	"	½ El	"	"	"	"	3	"	"	"	"	"	"	"	.....	"	"	"	.....	"
217	Morgan, A	144	36x6	36x5*	"	"	"	"	S & B	"	3	"	"	"	"	Ext	"	B & P	3	"	"	"	Ball	"
	Motorette (See Kelsey.)																							
218	Natco, 15	104	36x3½	36x3½	"	"	Rect	Cone	L & I	"	3	Jack	"	"	"	.....	.....	Plain	2	"	"	Roller	Plain	Ball
219	Newark, B	118	34x4½	34x4½	"	Plat	I B	"	.....	"	2	R A	Shaft	"	Float	Ext	Int	"	3	Roller	Ball	B & R	"	B & P
220	Ohio, M-N	115	34x4	34x4	"	½ El	"	M D	.....	"	3	U M	"	.....	"	"	"	"	.....	Ball	Roller	Ball	.....	Plain
221	Old Reliable	126	36x5	36x5*	"	"	"	"	.....	"	3	Amid	Chain	R R	Solid	Jack	"	"	3	"	Opt	Opt	B & P	B & P
222	Oliver, A	102	38x3	38x3½	"	"	"	"	Steel	Plan	2	U M	Shaft	T R	Float	Trans	.....	"	2	Roller	Roller	Roller	Plain	Plain
223	Oliver, B	133	36x3½	36x3*	"	"	"	"	"	"	2	"	Chain	R R	Dead	"	.....	"	2	"	"	"	Roller	"
224	Packard, 2-ton	120	34x3½	34x3½*	"	"	"	"	S & F	Prog	3	R A	"	"	"	Jack	Int	"	3	Ball	"	"	Ball	"
225	Packard, 3-ton	144	34x4	36x4*	"	"	Rect	"	"	"	3	U M	"	"	"	"	"	"	3	"	"	"	"	"
226	Packers, D	130	36x3½	36x5	"	"	I B	"	S & B	Sel	3	Jack	"	"	"	"	.....	"	3	Roller	"	"	P & R	"
227	Packers, E	150	36x5	36x5*	"	"	"	"	.....	"	3	"	"	"	"	"	.....	"	5	"	"	"	"	"
228	Peerless, T-C	151–174	38x6	42x6*	"	"	"	Cone	L & I	"	4	Amid	"	"	"	"	Int	"	3	Ball	"	"	Ball	Ball
229	Pierce-Arrow, 5-ton	156	36x5	40x6*	"	"	"	"	L & C	"	3	"	Shaft	"	Float	Trans	"	"	3	.....	"	B & R	Plain	"
230	Plymouth, D-3	123	34x3½	34x4	"	Plat	"	.....	A & F	Frict	Any	"	Chain	"	Dead	E & I	.....	.....	.....	.....	"	Roller	Ball	.....
231	Plymouth, G-2	135	34x5	36x3½*	"	"	"	.....	"	"	"	"	"	"	"	"	.....	Plain	3	.....	"	"	"	.....
232	Pope-Hartford	126	36x5	36x4*	.....	.....	"	Cone	L & C	Sel	3	"	"	T R	"	Jack	Int	"	.....	Plain	"	.....	.....	.....
233	Poss	98	34x3½	36x2½	½ El	½ El	Tube	.....	.....	Frict	Any	"	Chain	R R	.....	Int	.....	.....	.....	.....	.....	Roller	.....	.....
234	Randolph, 14	96*	34x3	36x3½	"	El	"	Cone	Leath	Sel	3	Jack	"	"	Dead	Jack	Int	Plain	2	Ball	Roller	"	Plain	Plain
235	Rassel, A	100	36x3	36x3½	"	Plat	I B	M D	Steel	"	3	U M	"	"	"	"	.....	"	3	Roller	"	"	Roller	"
236	Rassel, B	120	36x4	36x5	"	"	"	"	B & F	"	3	Amid	"	"	"	"	.....	"	3	Ball	"	"	"	"
237	Rassel, C	138	36x5	36x4	"	"	"	"	"	"	3	"	"	"	"	"	.....	"	3	"	"	"	"	"
238	Rassel, D	156	40x6	40x5	"	"	"	"	"	"	3	"	"	"	"	"	.....	"	3	"	"	"	"	"
239	Regal, 30	110	32x3½	32x3½	"	El	"	Cone	Leath	"	3	R A	Shaft	.....	Semi-F	.....	.....	"	.....	Roller	Ball	"	.....	"
240	Reo, H	90	36x2	36x2½	"	"	"	M D	S & Cp	Plan	2	U M	Chain	R R	Dead	.....	Jack	"	2	Plain	Roller	"	Plain	"
241	Rodgers, C	100	36x2	36x2½	Cross	"	"	.....	.....	Frict	Any	Amid	"	"	"	Int	.....	"	2	Ball	"	"	"	"
242	Rowe, A-B	120	34x3½	34x4	½ El	½ El	"	M D	Steel	Sel	3	"	Shaft	"	Float	E & I	.....	"	3	Roller	"	"	B & P	Roller
243	Sampson	94	34x4½	34x4½	"	¾ Plat	Rect	"	S & A	"	3	"	"	"	"	Int	Ext	"	2	"	Ball	"	Plain	Plain
244	Sampson, 1½-ton	110	32x4	34x5	"	"	I B	"	S & B	"	3	"	Chain	"	Dead	"	Int	"	3	B & R	Roller	"	Roller	"
245	Sampson, 3-ton	140	34x4	36x4*	"	½ El	"	"	"	"	3	"	"	T R	"	"	"	"	3	Ball	"	"	"	"
246	Sampson, 5-ton	154	36x6	36x6*	"	"	"	Cone	L & C	"	4	"	"	R R	"	Trans	"	"	3	"	"	"	"	Roller
247	Sandbert, J	88	..x3	..x3	"	Plat	"	M D	.....	Opt	3	"	"	"	"	Ext	.....	"	4	Roller	"	"	Plain	"
248	Sandusky, C	106	36x5	36x5	"	¾ Plat	Rect	Cone	Asbest	Sel	3	U M	"	"	"	Int	Int	"	3	Ball	"	"	Roller	Plain
249	Saurer, 4½-ton	153½	36x5	42x5*	"	½ El	"	"	L & I	"	4	Amid	"	"	"	Jack	.....	Ball	3	"	Ball	.....	Ball	Ball
250	Saurer, 6½-ton	159	36x5	42x6	"	"	"	"	"	"	4	"	"	"	"	"	.....	"	3	"	"	.....	"	"
251	Schacht, 21	144	36x5	36x5*	"	"	I B	"	Leath	"	3	"	"	"	"	Int	Trans	Plain	2	Roller	Roller	Roller	Roller	"
252	Schacht, 2-ton	132	36x4	36x3*	"	"	"	"	Therm	"	3	"	"	"	Rect	"	"	.....	.....	.....	"	"	"	.....
253	Schacht, D-E	103	32x3½	32x3½	"	El	"	"	"	Plan	2	Jack	"	"	Solid	"	.....	Plain	.....	Plain	"	Roller	.....	Plain
254	Schmidt, F	92	36x2	38x2	½ El	"	Opt	M D	Fiber	"	2	.....	"	"	Square	"	.....	"	.....	.....	Ball	Ball	.....	Ball
255	Schmidt, C	96	36x2½	38x2½	"	"	"	"	"	"	2	.....	"	"	"	"	.....	"	.....	.....	"	"	.....	
256	Seits	92	34x3	34x3	½ El	½ El	I B	.....	.....	Frict	Any	Amid	"	Springs	Float	.....	Trans	.....	.....	.....	Roller	Roller	Ball	Ball
257	Seits, 1-ton	108	36x3½	36x3½	"	"	"	.....	.....	"	"	"	"	R R	Dead	.....	"	.....	.....	.....	"	"	"	"
258	Seits, 2-ton	118	36x4	36x3½*	"	"	"	.....	.....	"	"	"	"	"	"	.....	"	.....	.....	.....	"	"	"	"
259	Seits, 3-ton	124	36x5	36x3½*	"	"	"	.....	.....	"	"	"	"	"	"	.....	"	.....	.....	.....	"	"	"	"
260	Seits, 5-ton	130	36x6	40x4*	"	"	"	.....	.....	"	"	"	"	"	"	.....	.....	.....	.....	.....	"	"	"	"
261	Service, A	114	..x2	..x2	"	"	Square	.....	.....	"	"	"	"	"	"	Int	.....	Plain	3	.....	Ball	Ball	"	Plain
262	Shelby	106	38x1½	38x1½	"	"	"	M D	Steel	Plan	2	U M	Shaft	T T	Semi-F	Ext	Int	"	2	.....	"	Roller	"	Ball
263	Shelby, ½-ton	110	36x2	36x2½	"	"	"	"	"	"	2	"	"	"	"	Int	"	"	2	.....	"	"	"	"
264	Shelby, 5-ton	150	36x4	36x5	"	Plat	I B	Cone	Leath	Sel	3	Jack	Chain	TT&RR	Dead	"	"	"	5	Roller	"	Ball	"	"
265	Speedwell, 12-Z	115	36x5	36x5*	"	½ El	"	"	L & I	"	3	Amid	"	R R	"	"	Jack	"	3	Ball	Roller	Roller	Roller	Plain
266	Speedwell, 12-Z	139	36x5	36x5*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
267	Speedwell, 12-X	139	36x5½	36x5½*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
268	S & S, E	125	32x4	34x4	"	Plat	"	"	S & L	"	3	"	"	"	"	Jack	Int	"	5	"	"	"	"	Ball
269	Standard, D	112	32x4	32x4	"	¾ El	"	M D	Steel	"	3	.....	Shaft	.....	Float	Int	"	"	3	"	Ball	Ball	.....	.....
270	Standard, B	108	36x4	36x4	"	½ El	"	"	"	"	2	.....	Chain	.....	Dead	.....	.....	"	3	"	Roller	Roller	.....	.....
271	Stearns, Standard	144	34x5	38x4½*	.....	.....	Solid	"	"	"	4	.....	"	R R	"	Jack	Int	"	5	Roller	.....	.....	.....	.....

NOTE—*Tires are dual. Abbreviations: Clutch: M. D., multiple disk; Con., contracting band; Exp., expanding band. Friction surface: Lin., linobestos; Ther., thermoid; A., asbestos; F., fiber; B., bronze; Leath., leather; S., steel; C., cork inserts; Cp., copper. Gearset location: Amid., amidship; U. M., in unit with the motor; Jack, on jackshaft; R. A., on the rear axle. Drive: Worm, shaft with worm gear. Car drives through: T. T., torsion tube; R. R., radius rod; T. R., torsion rods; S., springs. Brakes: Jack, on jackshaft; Int., internal expanding on rear hubs; Ext., external contracting on rear hubs; Trans., on transmission. Springs: El., elliptic; Plat., platform. Front axle: I. B., I-beam; Chan., channel.

Motor Specifications of Commercial Cars Made by American Manufacturers for 1912

No.	NAME AND MODEL	BODY	Weight	Price	Load Platform in Feet	Total Length in Feet	No. Cyl.	Bore	Stroke	H. P. S.A.E.	Piston Disp.	Cylinder Type	Cylinder, How Cast	Valve Location	COOLING		IGNITION			CARBURETER		Motor Lubr.
															Circulation	Radiator	System	Magneto	Control	Design	Fuel Feed	
272	Stearns, Special	Optional	10,000		15x6	22.0	4	4.75	6.00	36.1	425.3	L-Head	Separate	Side			Dual	Bosch		Own		Splash
273	Stegeman, 1-ton	"	2,000	2,250	8x—		4	3.75	5.25	22.5	231.9	"	En Bloc	"	Pump	Tube	Single	Eisemann	Gov		Gravity	Forced
274	Stegeman, 2-ton	"	4,000	2,950	10.6x—		4	4.13	5.25	27.3	280.6	"	"	"	"	"	"	"	"		"	"
275	Stegeman, 3-ton	"	6,000	3,500	11.8x—		4	4.13	5.25	27.3	280.6	"	"	"	"	"	"	"	"		"	"
276	Stegeman, 4-ton	"	8,000	3,950	12.3x—		4	4.50	5.50	32.4	349.9	"	Pairs	"	"	"	"	"	"		"	"
277	Stegeman, 6-ton	"	12,000	4,750	13x—		4	4.50	5.50	32.4	349.9	"	"	"	"	"	"	"	"		"	"
278	Stephenson, B	Ex. or Stake	2,000	2,000	9x3.6-5		4	4.25	5.00	28.9	283.6	T-Head	"	Opposite	"	"	"		Hand		"	"
279	Stephenson, C	"	6,000	3,500	14x6		4	4.75	5.50	36.1	389.9	"	"	"	"	"	"		"		"	"
280	Sternberg, 1-1½-ton	Optional	3,000	2,300	9x5	13.5	4	4.25	4.75	28.9	269.4	"	"	"	"	"	Dual	Eisemann	Gov	Stromberg	"	"
281	Sternberg, 2-ton	"	4,000	2,600	10x5	14.5	4	4.25	5.00	28.9	283.6	"	"	"	"	"	"	"	"	"	"	"
282	Sternberg, 3½-4-ton	"	8,000	3,750	14x6	19.0	4	4.75	5.50	36.1	389.9	"	"	"	"	"	"	"	"	"	"	"
283	Sternberg, 5–6-ton	"	12,000	4,500	15x6	20.0	4	5.25	7.00	44.1	606.1	"	"	"	"	"	"	"	"	"	"	"
284	Sullivan, 20	Express or Stake	1,500	1,050	5x3.1	11.5	2	4.50	4.50	16.2	143.1	L-Head	Separate	Hd. & Side	Thermal	"	Single	Bosch		Schebler	"	"
285	Sullivan, 51	Express	1,500	1,000	6x3.5	12.7	2	4.50	4.50	16.2	143.1	"	"	"	"	"	"	"		"	"	"
286	United States	Optional					4	4.75	5.00	36.1	354.4				Pump	Cell						
287	Universal, A	Platform	6,000	3,350	12.3x6	17.0	4	4.00	5.50	25.6	276.5	T-Head	Pairs	Opposite	"	"	Dual	Bosch	Hand	Rayfield	Gravity	Splash
288	U. S., B	Optional	2,000	1,950	9.5x4	13.0	2	5.25	4.50	22.0	194.8	L-Head	Separate	Side	Thermal	Tube	Single		"	Schebler	"	Forced
289	U. S., C	"	3,000	2,175	9.5x4	13.0	4	4.00	4.00	25.6	201.1	"	Pairs	"	Pump	"	Dual	Bosch	Gov	"	"	Splash
290	U. S., D	"	6,000		12x4.5-6	17.0	4	4.50	5.50	32.4	349.9	"	"	"	"	"	"	"	"	"	"	Forced
291	VanDyke, E	Express	1,000	1,000	6.5x3.8	10.3	2	4.50	6.00	16.2	190.8	"	Separate	"	"	Cell	"	S-X	Hand	Optional	"	"
292	Van, 102-A	Optional	2,000	1,650		16.5	4	4.00	4.00	25.6	201.1	I-Type	Pairs	Head	Thermal	Tube	"	Splitdorf	"	Stromberg	Optional	Splash
293	Van, 103-B	"	3,000	1,900		17.5	4	4.09	4.50	27.1	233.3	L-Head	En Bloc	Side	Pump	"	"		"	"	"	Forced
294	Veerac, 1912		1,500	850	7.2x3.1-4	11.6	2	4.00	4.00		100.5	2-Cycle	Separate		Air				"	Holley	Gravity	In Fuel
295	Velie, Y	Platform	3,000	3,000	12x5.5	19.0	4	4.00	5.25	25.6	263.9	L-Head	Pairs	Side	Pump	Cell	Single Double	Splitdorf	Gov	Stromberg	"	Splash
296	Velie, Z	"	6,000	3,500	Optional.	23.0	4	4.50	5.25	32.4	334.0	"	"	"	"	"	"	"	"	"	"	"
297	Victor, A	Ex. or Stake	1,500	1,700 & 1,750	7x3.5		4	3.75	4.50	22.5	198.8				"	"		Bosch				Forced
298	Victor, B	Optional	2,000	2,000			4	4.00	4.50	25.6	226.2				"	"		"				"
299	Victor, C	"	4,000	2,800			4	4.13	5.25	27.3	280.6				"	"		"				"
300	Victor, D	"	6,000	3,350			4	4.88	5.50	38.0	410.6				"	"		"				"
301	Victor	Bus		3,750			4	4.88	5.50	38.0	410.6				"	"		"				"
302	Victor, E	Optional	10,000	4,300			4	5.25	6.00	44.1	519.5				"	"		"				"
303	Victor	Fire Combination		4,600			4	5.25	6.00	44.1	519.5				"	"		"				"
304	Victor, F	Optional	14,000	5,200			4	5.00	6.50	40.0	510.5				"	"		"				"
305	Victor, G	"	20,000	5,800			4	5.75	6.00	53.0	623.2				"	"		"				"
306	Victor	Hook and Ladder		5,000			4	5.75	6.00	53.0	623.2				"	"		"				"
307	Victor	Fire Combination		5,800			6	4.88	5.50	57.0	615.9				"	"		"				"
308	Victor	" "		6,500			6	5.50	6.50	72.6	926.6				"	"		"				"
309	Walter, 2-ton	Optional	4,000	3,000			4	4.00	5.00	25.6	251.3	L-Head	Pairs	Side	"	"	Dual	"	Fixed	Stromberg	Gravity	"
310	Ward, G-2-A	Del. & Stake		2,100			4	4.00	4.50	25.6	226.2		"			"	"	Splitdorf	Hand	"	"	Splash
311	Warren, 12-30	Express	1,000	1,325	5.3x3.8		4	4.00	4.50	25.6	226.2	L-Head	En Bloc	Side	Pump	Tube	Double	Bosch	Fixed	McCord	Gravity	"
312	White, G-B-E	Optional	1,500	2,250			4	3.75	5.13	22.5	226.4	"	"	"	"	Cell	Single	"	"	Own	"	Forced
313	White, G-T-B	"	3,000	3,150			4	3.75	5.13	22.5	226.4	"	"	"	"	"	"	"		"	"	"
314	White, G-T-A	"	6,000	3,850			4	3.75	5.13	22.5	226.4	"	"	"	"	"	"	"		"	"	"
315	White, T-C	Platform	10,000	4,700			4	4.25	5.75	28.9	326.3	"	"	"	"	"	"	"		"	"	"
316	Whitesides	Optional	1,500	1,450	Optional	Optional	4	4.50	4.50	32.4	286.3	"	"	"	Thermal	"	Double	Splitdorf	Hand	Marvel	"	"
317	Wichita, A	"	1,200	1,450	6.5x3.9		4	3.25	5.00	16.9	165.9	"	"	"	"	Tube	Single	Bosch	"		"	"
318	Wichita, B	"	2,000	1,750	8.5x6		4	3.25	5.00	16.9	165.9	"	"	"	"	"	"	"	"		"	"
319	Wilcox, I	"	2,000	2,300	Optional	17	4	4.25	4.50	28.9	255.3	"	Pairs	"	Pump	"	Dual	"	"	Bennett	"	Splash
320	Wilcox, K	"	3,000	2,500	"	18	4	4.25	4.50	28.9	255.3	"	"	"	"	"	"	"	"	"	"	"
321	Wilcox, J	"	6,000	3,250	"	20	4	4.25	4.50	28.9	255.3	"	"	"	"	"	"	"	"	"	"	"
322	Hewitt, 1-ton	"	2,000	1,800			4	3.25	4.75	16.9	157.6											
323	Hewitt, 1½-ton	"	3,000	2,100			4	3.25	4.75	16.9	157.6											
324	Hewitt, 2-ton	"	4,000	2,500			2	5.50	5.00	24.2	237.6											
325	Hewitt, 2½-ton	"	5,000	2,750			2	5.50	5.00	24.2	237.6											
326	Hewitt, 3½-ton	"	7,000	3,500			4	4.25	6.00	28.9	340.4											
327	Hewitt, 4½-ton	"	9,000	4,000			4	4.25	6.00	28.9	340.4											
328	Hewitt, 5½-ton	"	11,000	4,500			4	4.25	6.00	28.9	340.4											
329	Hewitt, 5½-ton	"	11,000	4,500			4	4.25	6.00	28.9	340.4											
330	Hewitt, 7-ton	"	14,000	5,000			4	4.25	6.00	28.9	340.4											
331	Hewitt, 10-ton	"	20,000	5,500			4	4.25	6.00	28.9	340.4					"						
332	Moore, A	Optional	2,000	2,100	10x6	14.3	4	4.13	5.25	27.3	280.6	L-Head	En Bloc	Side	Pump	Cell	Dual		Gov	Schebler	Gravity	Splash
333	Moore, B	"	4,000	2,600	13x6	17.3	4	4.50	5.50	32.4	349.9	"	Pairs	"	"	"	"	"	"	"	"	"
334	Moore, C	"	6,000	3,500	13x6.5	17.5	4	5	6.60	40.0	471.2	"	"	"	"	Tube	"	"	"	"	"	"

NOTE—Where body is optional, price usually refers to chassis alone. Abbreviations: Thermal, thermo-syphon circulation; Tube., tubular radiator; Cell., cellular or honeycomb radiator. Bore and stroke are given in decimals to the nearest 1-100th inch; as, 4.50=4½, etc., .06=1-16, .13=⅛, .19=3-16, .25=¼, .31=5-16, .38=⅜, .81=13-16, .88=⅞, .94=.44=7-16, .50=½, .56=9-16, .63=⅝, .69=11-16, .75=¾, 15-16, 1=1.00.

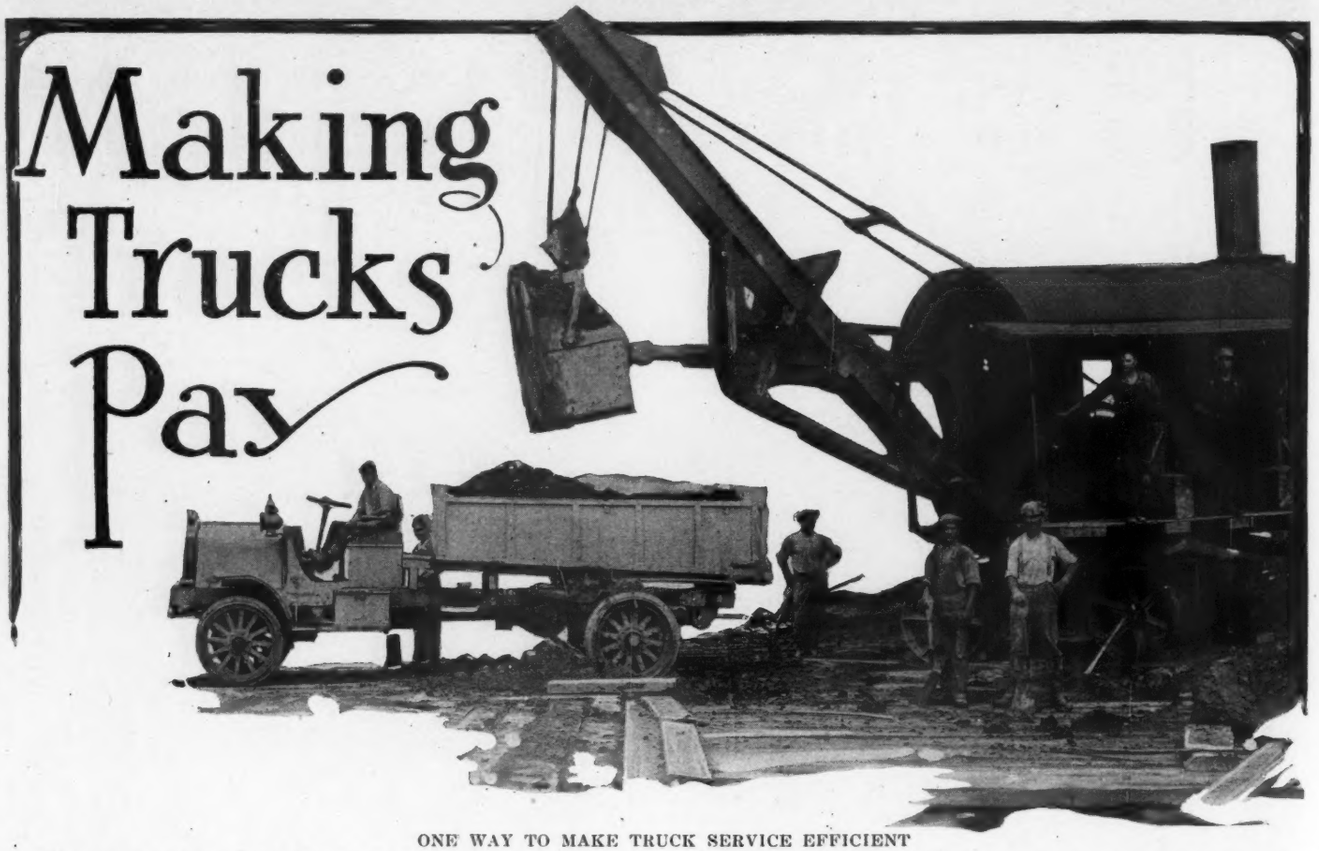
15-16, 1=1.00.

Transmission and Running Gear Specifications of American Commercial Cars for 1912

Table No.	NAME AND MODEL	RUNNING GEAR							TRANSMISSION									BEARINGS						
		Wheel Base	TIRES		SPRINGS		Front Axle	CLUTCH		GEARSET			Drive	Car Drives Through	Rear Axle	BRAKES		CRANKSHAFT		Gearset	Front Wheel	Rear Axle	Steering Knuckle	Steering Gear
			Front	Rear	Front	Rear		Type	Friction Surface	Type	No. Speed	Location				Serv.	Em.	Type	No					
272	Stearns, Special	180	34x5	38x4½*			Solid	M D	Steel	Sel	4		Chain	R R	Dead	Jack	Int	Plain	5	Roller				
273	Stegeman, 1-ton	130	34x3	36x4½	½ El	½ El	Rect	"	S & A	"	3	U M	Shaft	"	Float	Trans	"	Plain	3	Ball	Ball	Ball	B & P	B & P
274	Stegeman, 2-ton	140	34x4	36x3*	"	"	"	"	"	"	3	"	Chain	"	Dead	"	"	"	3	"	"	"	"	"
275	Stegeman, 3-ton	150	36x4	38x4*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
276	Stegeman, 4-ton	155	36x5	40x5*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
277	Stegeman, 6-ton	165	36x6	40x6*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
278	Stephenson, B	112	40x3½	40x3½	"	½ Plat				Frict	Any	"	"	"	"	Int		"	3		"	"	Ball	Plain
279	Stephenson, C	136	42x5	42x5	"	"				"	"	Amid	"	"	"	"		"	3		"	"	"	"
280	Sternberg, 1-1½-ton	110	34x3½	36x4	"	½ El	I B	M D	S & B	Sel	3	"	"	"	Float	"	Jack	"	3	Ball	Roller	Roller	Plain	Ball
281	Sternberg, 2-ton	116	34x4	36x5	"	Plat	"	"	"	"	3	"	"	"	Dead	"	"	"	3	"	"	"	"	"
282	Sternberg, 3½-4-ton	144	36x5	40x5*	"	½ El	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
283	Sternberg, 5-6-ton	152	36x6	42x6*	"	"	"	"	"	"	3	"	"	"	"	"	"	"		"	"	"	"	"
284	Sullivan, 20	92	36x2½	36x2½	El	El	Square	Cone	Steel	Plan	2	U M	"	"	"	"	Trans	"	2	Plain	Ball	Ball	"	"
285	Sullivan, 51	110	36x2½	36x2½	"	"	"	"	"	"	2	"	"	"	"	"	"	"	2	"	"	"	"	"
286	United States	138	36x4½	36x4½			I B			Sel	3											Roller		
287	Universal, A	132	36x5	36x4*	½ El	½ El	"	M D	S & R	"	3	Jack	Chain	R R	Dead	Jack	—	Plain	3	Roller	Roller	"	Plain	Plain
288	U. S., B	118	34x3	36x3½	"	El	Square	Cone	"	"	3	"	"	"	"	"	Int	"	2	"	"	"	Ball	Ball
289	U. S., C	118	34x3½	36x4	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	Ball	"	"	"	Plain
290	U. S., D	144	34x5	36x5*	"	½ El	I B	"	"	"	3	"	"	"	"	"		"	3	"	"	"	Roller	"
291	Van Dyke, E	86	32x3	32x3	"	Plat	Tube			Frict	Any		Shaft	Springs	Semi-F	Ext	Int	"	2		Ball	"	Plain	"
292	Van, 102-A	118	36x3	40x3½	"	"	Rect	Cone	L & I	Sel	3	Amid	Chain	R R	Dead			"	3	Ball	"	Ball	Ball	"
293	Van, 103-B	130	36x3½	40x4	"	"	"	"	"	"	3	"	"	"	"	Ext		"	3		"	"	"	"
294	Veerac, 1912	82	..x2	..x2	¾ El	El	Square	M. D	Steel	Plan	2	Jack	"	"	"	Int		"	2	Plain	"	"	Plain	"
295	Velie, Y	148–172	36x5	36x3½*	½ El	½ El	I B	"	S & B	Sel	3	Amid	"	S&RR	"	Jack	Int	Ball	3	Roller	Roller	Roller	"	Ball
296	Velie, Z	148	36x5	40x5*	"	"	"	"	"	"	3	"	"	R R	"			Plain	3	"	"	"	Roller	"
297	Victor, A	105	34x2½	34x3	"	"	Rect	"		"	3				"	Int	Jack					"		
298	Victor, B	120	34x3	34x4	"	"	"	"		"	3				"	"	"					"		
299	Victor, C	140	36x4	36x3	"	"	I B	Opt		"	3				"	"	"							
300	Victor, D	146	36x5	36x4	"	"	"	"		"	3				"	"	"					Roller		
301	Victor	140	36x4	36x3	"	"	"	"		"	3				"	"	"					"		
302	Victor, E	146–158	36x6	36x5	"	"	"			"	3				"	"	"					"		
303	Victor	140	40x6	40x6			"	Cone		"	3				"	"	"			Roller		"		
304	Victor, F	146–158	36x7	42x6	½ El	½ El	"	Opt		"	3				"	"	"					"		
305	Victor, G	146–158	36x7	44x7	"	"	"	Cone		"	3				"	"	"					"		
306	Victor	204	36x4	38x3½			"	"		"	3				"	"	"					"		Plain
307	Victor	168	36x4	36x3½			"	"		"	3				"	"	"					"		"
308	Victor	168	36x5	36x4			"	"		"	3				"	"	"					"		
309	Walter, 2-ton	124	36x4	36x5	½ El	Plat	Square	"	Fabric	"	3	Amid	Chain	R R	"			B & P	3	Ball	Ball	Ball	Ball	Roller
310	Ward, G-2-A	124	32x4½	32x4½	"	½ El	I B	M D	Steel	"	3	U M	Shaft		Float	Ext	Int	Plain	3	"	"			
311	Warren, 12-30	110	32x4	32x4	"	½ El	"	Cone	L & I	"	3	Amid	"	Springs	Semi-F	"	"	"	2	Plain	"	B & R	Plain	Plain
312	White, G-B-E	120	34x4½	34x4½	"	½ El	"	"	Leath	"	4	"	"	R R	"	"	"	Ball	3	Ball	"	Ball	Ball	Ball
313	White, G-T-B	144	36x4½	36x4½*	"	"	"	"	"	"	4	"	"		"	"	"	"	3	"	"	"	"	"
314	White, G-T-A	144	36x5	40x4*	"	"	"	"	"	"	4	"	Chain	"	Dead	Jack	"	"	3	"	"	"	"	"
315	White, T-C	162	41x6	41x6*	½ El	"	Solid	"	"	"	4	"	"	"	"	"	"	"	3	"	"	"	"	"
316	Whitesides	118	34x2½	34x2½	El	El	I B	M D	S, B&F	Plan	2	"	"	"	"	"		Plain	2	"	Roller	Roller	Plain	B & P
317	Wichita, A	104	34x3	34x3	½ El	½ El	"	Cone	A & I	Prog	3	Jack	"	"	"	"		"	2	B & R	Ball	Ball	"	"
318	Wichita, B	112	34x3	34x4	"	"	Rect	"	"	"	3	"	"	"	"	"		"	2					
319	Wilcox, I	117	36x3	36x3½	El	Plat	I B	"	Therm	Sel	3	Amid	"	"	"	"	Ext	"	3	Roller	Roller	Roller	Roller	Ball
320	Wilcox, K	117	36x3½	36x4	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	"
321	Wilcox, J	126	36x4	36x3½*	"	"	"	"	"	"	3	"	"	"	"	"	Int	"	3	"	"	"	"	"
322	Hewitt, 1-ton									"	3									"	"	"	Plain	B & P
323	Hewitt, 1 1-2-ton									"	3									"	"	"	"	"
324	Hewitt, 2-ton									Plan	2									"	"	"	"	"
325	Hewitt, 2½-ton									"	2													
326	Hewitt, 3½-ton									Sel	3									"	"	"	"	"
327	Hewitt, 4½-ton									"	3									"	"	"	"	"
328	Hewitt, 5½-ton									"	3									"	"	"	"	"
329	Hewitt, 5½-ton									Plan	2									"	"	"	"	"
330	Hewitt, 7-ton									"	2													
331	Hewitt, 10-ton									"	2									"	"	"	"	"
332	Moore, A	100	34x3½	34x4	½ El	½ El	I B	Cone	L & I	Sel	3	Amid	"	"	"	Jack	Int	Plain	3	Ball	Roller	Roller	Roller	Ball
333	Moore, B	126	36x4	36x3*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	Roller
334	Moore, C	130	36x5	36x4*	"	"	"	"	"	"	3	"	"	"	"	"	"	"	3	"	"	"	"	Ball

NOTE—*Tires are dual. Abbreviations: Clutch: M. D., multiple disk; Con., contracting band; Exp., expanding band. Friction surface: Lin., linobestos; Ther., thermoid; A., asbestos; F., fiber; B., bronze; Leath., leather; S., steel; C., cork inserts; Cp., copper. Gearset location: Amid., amidship; U. M., in unit with the motor; Jack, on jackshaft; R. A., on the rear axle. Drive: Worm, shaft with worm gear. Car drives through: T. T., torsion tube; R. R., radius rod; T. R., torsion rods; S., springs. Brakes: Jack, on jackshaft; Int., internal expanding on rear hubs; Ext., external contracting on rear hubs; Trans., on transmission. Springs: El., elliptic, Plat., platform. Front axle: I. B., I-beam; Chan., channel.

Making Trucks Pay



ONE WAY TO MAKE TRUCK SERVICE EFFICIENT

The use of the steam shovel for loading the truck in construction work is new, but serves as a good example how truck efficiency can be improved. This shows a Packard in the service of the R. T. Ford Co., Rochester, N. Y. Needless to say a dumping body is used to unload, which truck does the work previously done by eight teams

EIGHTY thousand tons of coal are delivered to the schools of Chicago in a year and yet not one school in that city has facilities which will permit of the use of a dumping body for coal deliveries.

It takes the Motor Transfer and Fuel Co. 55 minutes on an average to unload its 4½-ton coal truck by hand, two men shoveling. The City Fuel Co. can unload its hopper-bottom coal truck in 4 minutes under favorable conditions and in an average of 10 minutes.

The 5-ton truck of the Morton Salt Co., on a recent occasion, took 40 minutes to make a trip of 2 miles through congested Chicago streets.

Through the demands of present delivery schedules Chicago department stores lose from 40 to 50 per cent of the possible running time of their big trucks during working hours.

These examples but indicate a few of the difficulties which must be overcome in the problem of making trucks pay in certain lines of business, and some of the mistakes which are being made in present methods of truck operation. On the other hand it is interesting to note that the city library of Chicago, running five small trucks,—three of which were purchased in 1905 and all of which are of ancient vintage,—made deliveries during last November aggregating 5,500 miles and at a running cost of $231.58.

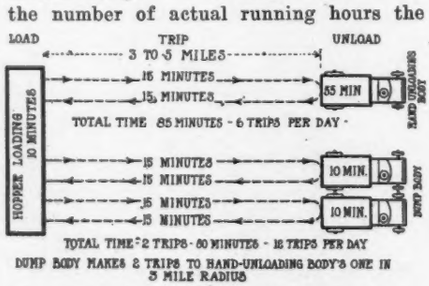
If a motor truck is to be made to pay as a dollars-and-cents proposition its idle moments during working hours must be few.

To save 20 minutes with a horse vehicle means a loss of but a mile and a half of service and the delay on a $1,000 investment; for a truck to stand idle for this period means the loss of 4 to 6 miles of delivery service and interest on a $3,000 to $6,000 investment.

Situation in a Nutshell

It costs about as much to run a 2½ to 4-ton truck as to use two teams and wagons of equal weight capacity. The truck, however, is plenty able in itself to do the work of three teams at this cost of two, if allowed to work unhindered. If delayed by traffic, or improper loading or poor unloading facilities, however, there comes a point at which teams can do the work just as cheaply, and, if the hauls be short, at a considerably less figure than motor vehicles of large size.

The successful use of the motor truck in the future depends on the extent to which useless delays can be eliminated and on the number of actual running hours the truck can put in during a working day.



HOW LOADING TIME AFFECTS SERVICE

The importance of eliminating delays is shown very forcibly in the case of the coal-loading time of the Motor Transfer and Fuel Co., before mentioned.

Here 55 minutes is spent in unloading a 4½-ton load. With hopper bodies loads are being discharged in under 10 minutes by actual count, including time for backing into position and locating the chute. Suppose this company delivers a load of coal to a point distant a 15-minute run from its yards—where loading, by the way, is by the modern hopper method. The run out and back will take 30 minutes, the unloading 55, a total of 85 minutes to deliver a load within a 3- to 5-mile radius.

Suppose we use a dumping or hopper body on the same trip. The run both ways will be the same, 30 minutes, but the unloading 10 minutes. This makes a total of 40 minutes for the trip and delivery, so that while the hand-unloading body makes one trip, the dump body will make two with 5 minutes to spare, not counting the time of reloading, which would be 10 minutes. This makes six trips a day for the truck and hand unloading, and twelve trips for the dump body. Without making at least ten trips a day a truck of this capacity and first cost could hardly be made to pay as against horse delivery, so that for hauls of this length some sort of quick dumping body seems imperative, if the truck is to be a financial proposition.

There often are conditions in delivery

which do not admit of dump bodies, a problem which demands coöperation between coal dealer and user to devise and adopt a scheme which shall fit all the demands of the user and at the same time allow the quick delivery of the coal or other product by the trucking concern or coal man.

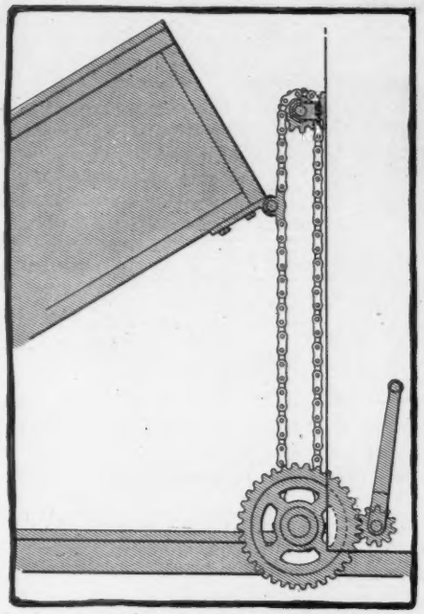
The Morton Salt Co. of Chicago has this trouble in its deliveries of bulk salt, in that no two receiving conditions are the same and more often than not the salt must be shoveled out and up into a bin higher than the truck. This means standing time for the truck and a loss.

Example in Chicago

As to coal, the Chicago public school example is the most glaring, a case where 80,000 tons of coal must be shoveled out by hand every year, and delivered to windows in no case less than 6 feet from the ground, according to the City Fuel Co. There undoubtedly is some way that could easily be arranged at little expense so that the coal could be unloaded for these schools by hopper method, thus saving the schools thousands of dollars in a year. At the same time the coal dealer would be able to use trucks for his work at a great saving.

Poor receiving facilities are largely responsible for losses in efficiency in motor truck service, especially in our larger cities.

Many buildings receiving deliveries in narrow alleys, large office buildings for instance, have a very small receiving platform and no receiving clerk to take the goods. This means that when a wagon or truck makes a delivery after waiting its turn to get to the platform, it must stand idle in the alley hindering traffic while the driver takes a slow freight elevator up eight or ten stories, looks up the right party and gets his receipt signed, rides down again and gets his box, takes it up in the elevator, delivers it, and rides down again. Meanwhile a boy must watch the load.



MACK DUMPING PRINCIPLE

This diagram illustrates the principle of elevating the forward end of the dumping body on the Mack 5-ton truck, illustrated on this page

This takes 10 to 20 minutes, requires an extra boy on the wagon, and blocks up the alley for all this time so that any truck coming through to make a delivery at that building or any other in the alley must wait its turn in getting through, a delay which is costly.

On a recent occasion Armour & Co's 3-ton electric truck took 10 minutes to deliver a small box of soap to a neighboring store platform on account of a congestion of this kind at the Heyworth building in Chicago, blocking one side of the alley completely.

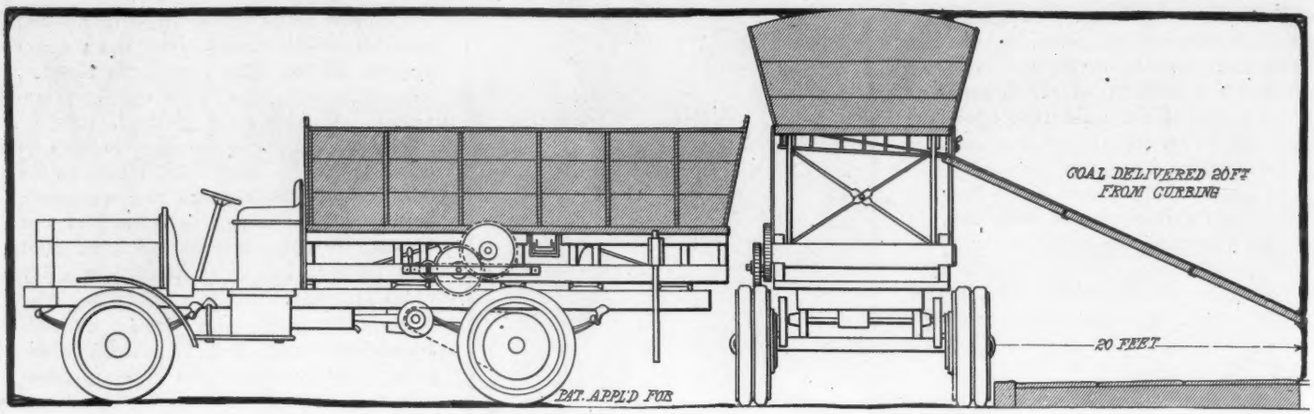
Simple Solution Proposed

This congested traffic condition could be done away with very simply by having a man at the receiving platform to receipt for all incoming packages and deliver them to the tenants of the building himself. He could care for outgoing packages as well.

The four-horse wagon of the Boston store in Chicago loses from 20 to 30 minutes nearly every trip in getting from the street through the narrow alley half a block to the loading platform. This is, in a measure, due to poor alley surface, but largely to poor receiving conditions in neighboring stores

DUMPING TRUCK IN CONSTRUCTION SERVICE

This illustration shows the use of the 5-ton Mack truck in the active unloading of building material. The dumping scheme is diagrammatically illustrated on this page, the forward end of the truck being lifted through the medium of two endless chains. This dumping may be done by hand or motor power, hand power being used in this particular case



ELEVATION OF SIDE AND REAR OF BODY BY THOMAS WRIGHT CO.

This is the Monarch Eureka elevated side discharge coal body built by the Wright company and illustrated on a Packard truck. The end elevation shows the body raised so as to unload by gravity across a 20-foot sidewalk

and buildings. The morning of December 28 it took 22 minutes to get in.

Here again is a case where the stoppage of the team is not so important as if it had been a truck, for the mileage lost was much less than it would have been in the case of a truck, yet 20 minutes a day lost means that the firm loses 1 day of time out of every month in the team service, during which time it stands idle, waiting to get into the alley, while the driver warms his hands under the robe or cools his heels on the dash board, as the weather dictates. With a truck this loss would be considerable and enough to make for a possible failure in its competition with horse service.

Receiving systems in new buildings also are at fault and the fact of the driver having to hunt up this contractor or that on a building job before the receipt for his goods can be signed and the goods delivered,—instead of getting a receipt from a clerk there for the purpose,—so far has hindered the truck from being a big financial success in many lines of the building industries.

Where conditions are such as to permit of its use the dumping body has greatly helped toward making trucks pay in many lines of business, and a brief description of the more prominent types, with a discussion of their construction, advantages and disadvantages, is not out of place at this point.

Four Types of Bodies

There are four leading types of dumping bodies—those hinged at the rear, the front end being raised for dumping; the sliding type which rolls to the rear and dumps, the front end rising of course as the rear end falls on the fulcrum of the rear end of the frame; the elevating type, which is lifted entirely off the chassis and dumps at rear or side or both; and the hopper type, which unloads by gravity on the removal of a slide or door suitably placed below or at the side.

Each one of these types is suited to certain conditions and each has its peculiar advantages and disadvantages, and while no one of these dumping bodies will fit all conditions, yet the striving is toward types which will fit the greater number of requirements with the fewest changes in construction.

The type which hinges at the rear end of the chassis is handy in that it does not take up any extra room while dumping, so far as length is concerned at least, but has the disadvantage that the load must always be dumped to the rear. It is largely used, however, in contracting work and the like.

The Packard truck, shown at the head of this article, has a dumping body of this type, and for the service in which it is shown its adaptability can readily be seen.

Here is a case where the users are saving time at both ends of the run, loading quickly at the receiving end of the job by means of the steam-operated shovel, and unloading at the other limit of the run by means of the dump body. Were it not for the saving effected by these time-saving devices in connection with the truck, instead of the waste time of hand loading and unloading by old methods, it is doubtful if a truck would be made to pay except for long hauls.

By loading the trucks with the steam shovel and using dump bodies each truck is doing the work of eight teams for the R. T. Ford Co. of Rochester, N. Y., over a mile haul.

The 5-ton Mack shown in the second illustration hinges at the rear end of the chassis also, but has considerable overhang at the rear so that in extreme dumping position the body comes close to the ground.

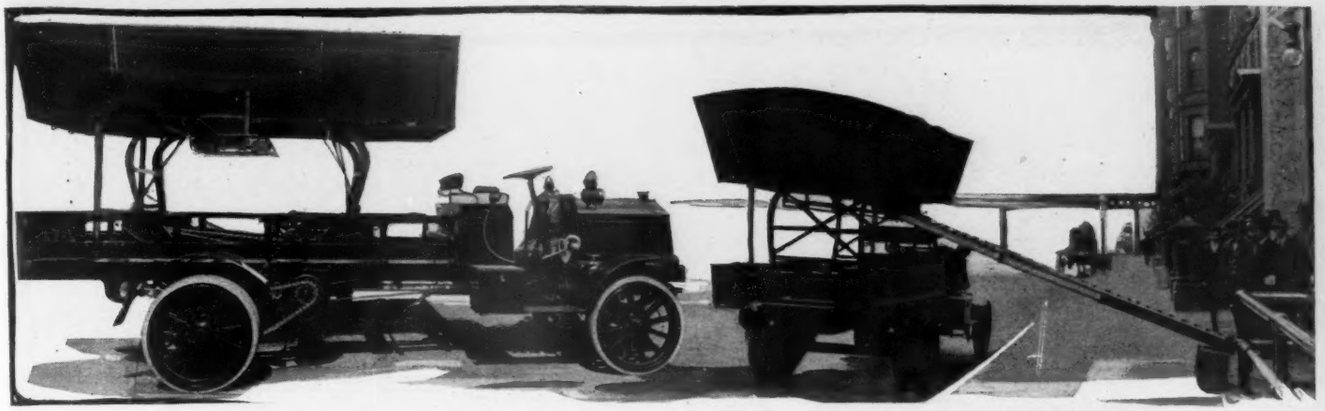
The dumping device is operated by crank and hand power or can be driven by the power of the motor, and consists of suitable reduction gearing operating from the crank-driving sprockets over which run two endless vertical chains. The forward end of the body is fastened to the chains by suitable fastenings so that with their movement up or down the front end of the body moves with them.

Mechanism of Dumping Device

The separate sketch shows the mechanism of this dumping device with the gear train operating the chains and the connection of the chains to the forward end of the body. The fore-and-aft motion of the body in swinging its arc is taken care of by the swing of the chain. The chassis of this machine is of the standard type with the

PACKARD REAR DISCHARGE COAL WAGON

This is a hand-operated elevating type of coal body for rear discharge. This body type is in actual service in New York city and giving good results



SIDE DISCHARGE WAGON IN SERVICE

Here are shown two views of the side-discharge elevating coal body of Thomas Wright company on Packard truck. The adaptation of this body type for discharge across the sidewalk appears to advantage, the elevating of the body is by hand power

wheelbase suited to the conditions and size of body desired.

Two types of this Mack dumping body are made, one operated by hand, as shown and the other by the power of the motor.

Mack Dumping Body

In the motor-driven type the lower shaft, which, in the view shown is driven by the crank, is driven from a small countershaft in the transmission, a worm reduction gear being used. This extra countershaft is driven by a spur gear which is made to mesh with the second speed gear of the transmission. It is so arranged by stops on the chain that when the body has reached its extreme up or down position the clutch is automatically disengaged. The mechanism also is arranged so that it is impossible to drive the truck while the body is being raised or lowered, though there is nothing to hinder its movement after this operation is completed, such as running with the body in dumping position for spreading the load. In the illustration the truck is shown in the actual service of unloading building material.

In many cases of delivery, more especially in the case of coal service there are occasions where the load must be shunted across a sidewalk and into a window, or down a coal hole some distance away.

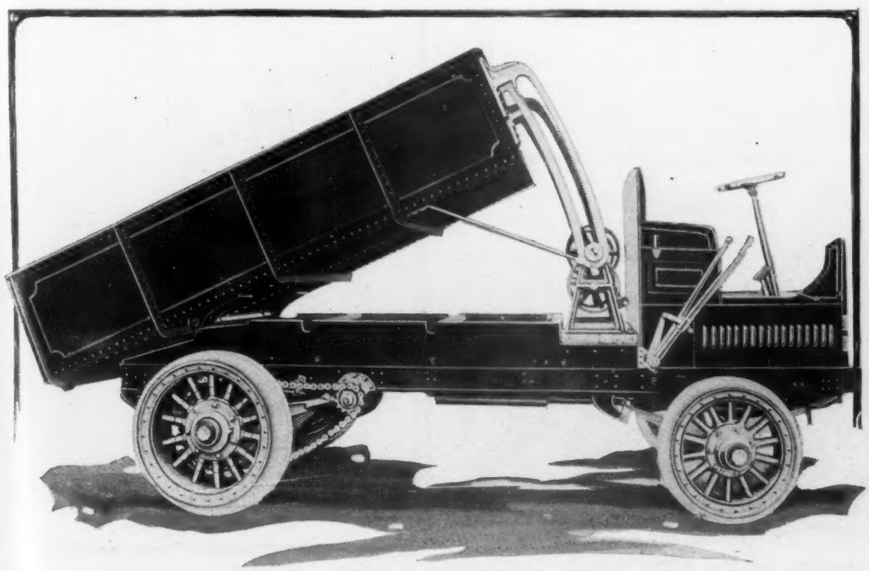
In cases like these the dumping body pure and simple are of little advantage except as it can drop its load in the street and let the carrying to the window, or coal hole, be done by manual labor. For this class of service therefore the raised or elevated type of body has been developed.

Several types of these are shown in the illustrations, some arranged to discharge their load at the rear only, some at the side, and others designed to do either.

In most of these types the elevating of the body is accomplished by a "scissors" or parallel ruler type of frame operated either by gearing, screw thread or windlass cranking mechanism. The rear pair of arms generally is made shorter than the front set to allow for the inclination of the load. The Packard rear discharge coal wagon shown in the illustration is a machine of this type.

Here the body is mounted upon side members which are operated by gearing seen on the outside of the car just forward of the rear wheel, this gearing acting as a reduction between the crank and the hoisting mechanism. This body is fitted with side chutes so that the load can be discharged either from the rear or from the side as circumstances may dictate. This body is in actual use in delivering coal in New York city and is giving excellent results. It was designed and constructed by the Thomas Wright company.

Another illustration shows a somewhat similar elevating body built by the same company. Two views of this are shown, one a side view giving a good idea of the frame work supporting the body when elevated, and showing a part of the operating mechanism, while the other view taken from the rear shows the truck discharging its load across the full width of a 20-foot sidewalk. A body of this type has the advantage that its load can be discharged without the necessity of any turning or backing, or blocking of the street or alley during the time in which the coal is being unloaded. As shown this type of body is fitted to a Packard chassis.



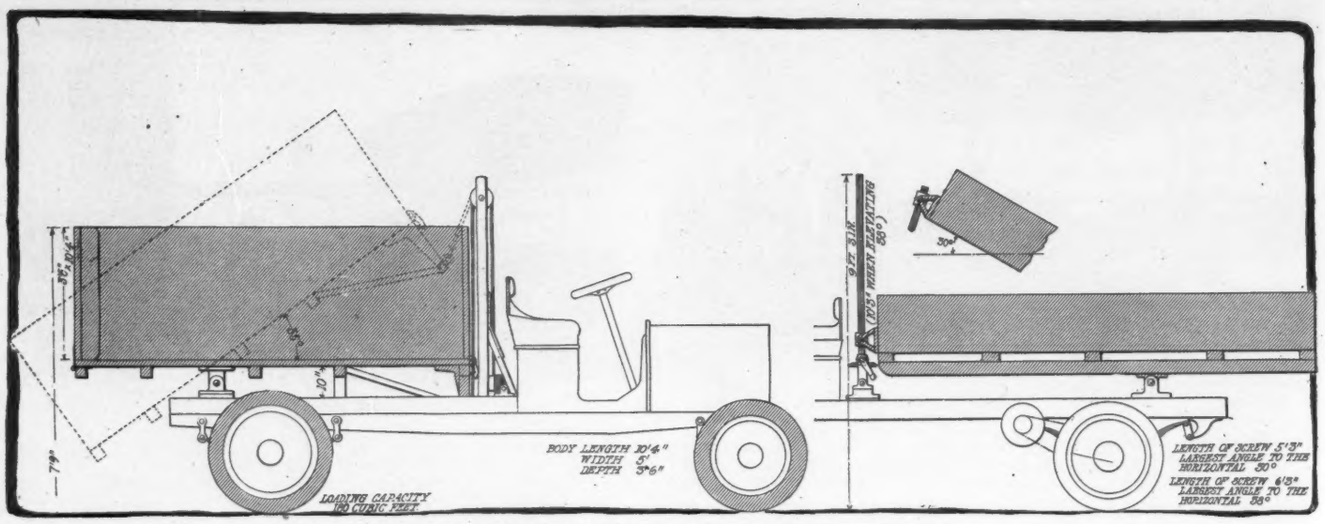
ALCO COAL DUMPING BODY

The dumping of this body is by rack and pinion, the large arc-shaped rack attaching to the forward end of the body and engaging with a pinion which is operated by hand

Efficient Unloading Mechanism

The Alco truck is shown with a coal-dumping body having a peculiar but very efficient unloading mechanism. In this type the body is built up of sheet steel reinforced and raised up from the chassis to a certain extent by longitudinal members as shown. The body is hinged underneath at a point slightly to the rear of the rear axle. At the forward end are fitted two gear segments, which might almost be termed racks on account of their great radius of curviture. These extend down below the body and are braced to it from their lower end. Just back of the seat a frame is fitted, in which is arranged reduction gearing from a crank member running out to one side. On turning this crank through the medium of the reduction gearing, a pinion engaging with the rack teeth pushes up on the gear or rack segment and thus raises the body.

This makes a very efficient type of unloading mechanism outside of its expensive manufacture and for certain classes of work where there is plenty of room to discharge the load at the rear in every case. A body



TWO TYPES OF McFARLAN & CO's. DUMPING BODIES

The dumping body shown at the left is of the windlass type, and is hand operated. It has a possible elevation of 35 degrees. The inside body measurements are 10 feet 4 inches long, by 3 feet 6 inches high. The body at the right is elevated by the endless thread type, the length of screw being 5 feet 3 inches for a 30-degree angle and 6 feet 3 inches for a 38-degree angle

of this sort means a great saving in the operation of the clutch.

Two types of dumping bodies made by McFarlan & Co. are shown in the line drawing. The one at the left is of the windlass type, with a sort of derrick just forward of the body, a cable running from a projection under the forward end of the body up over a grooved pulley at the top of the upright and down on the other side to a windlass operated by a crank through the medium of a gear reduction.

It will be easily seen from this how the winding up of the cable on the windlass drum will raise the forward end of the body. This is hinged about two-thirds of the way back toward the rear so that a considerable range of angle can be had without the derrick upright being too high for ordinary traffic conditions.

The second type of body from the same factory is operated in a somewhat different manner. In this case the work is accomplished through the medium of a long screw thread and nut. The nut is fitted to swivel in a frame at the forward end of a tilting body while through it passes the upright rod with the screw thread cut in it. At the lower end of this column is a beveled gear wheel with which the beveled pinion engages, the shaft of this pinion terminating in a crank.

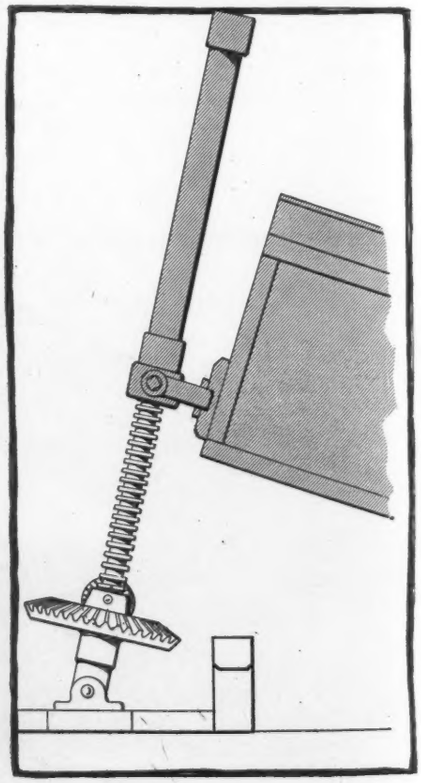
Operation of Mechanism

On turning the crank the whole threaded column is rotated through the medium of the beveled gear so that the nut through which this column passes rises with the thread as the column turns, thus raising with it this end of the dumping body. The fore-and-aft motion of the column is taken care of below by a swiveled bearing just below the beveled gear while the nut fastened to the body by a frame is also arranged to swivel to take care of the differing inclination of the rod as the body rises.

The Pierce-Arrow truck is fitted with a dumping body in the illustration shown, arranged with a somewhat similar type of body-raising apparatus, shown in smaller sketch.

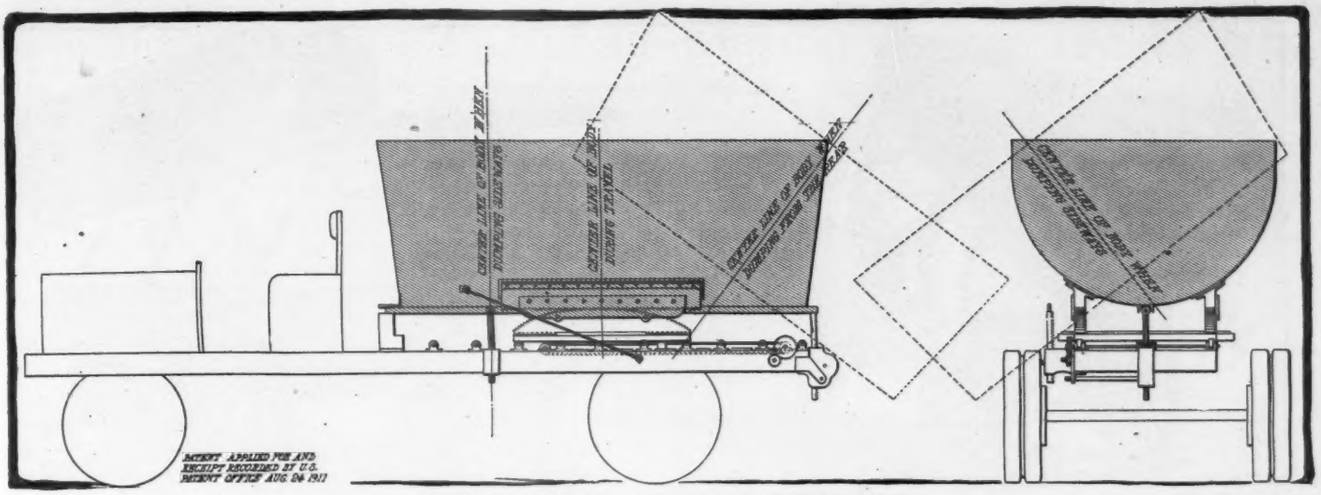
In this case the upper part of the screw-threaded column is inclosed to prevent dirt from working into the thread. When the body is down the thread is completely covered by the casing and only comes out of it as the body goes into the up position. The tubular case is fastened to the nut which works on the column and all together swivel about the central axis of the nut where it is joined to the dump body. The turning of the column is accomplished by beveled gearing and a crank as in the former example.

The body itself is arranged for either side or rear unloading, though it can only dump to the rear. There are two chutes provided, however, on either side for gravity unloading where there is not room to back across the street for rear-end delivery. The body



PIERCE-ARROW TRUCK WITH SCREW TYPE DUMP

This body is shown as a combination one, namely for rear dumping as illustrated. The screw device for elevating the body being shown in diagram at the right. This body is provided with two side delivery chutes for gravity unloading. The side chutes may be used when there is not room to back the car across the street as needed for rear-end unloading


CENTER LINE OF BODY DUMPING SIDEWAYS
CENTER LINE OF BODY DURING TRAVEL
CENTER LINE OF BODY DUMPING REAR
CENTER LINE OF BODY DUMPING SIDEWAYS
PATENT APPLIED FOR AND RECEIPT RECORDED BY U.S. PATENT OFFICE AUG 24 1911

COMBINATION SIDE AND REAR DUMPING BODIES

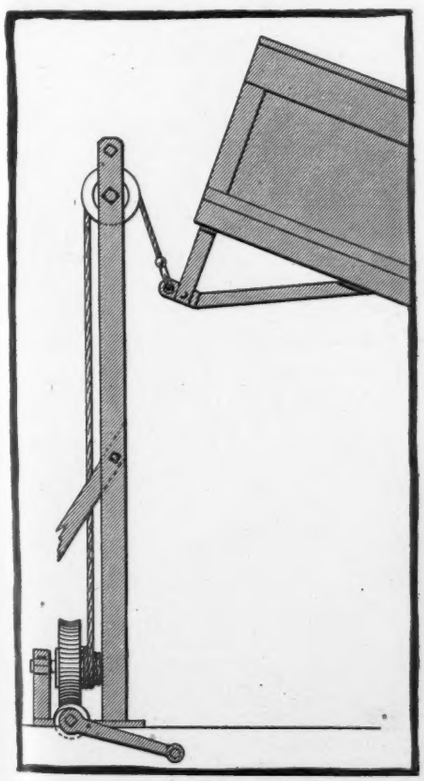
This is a patented dumping body and as indicated by dotted lines is suited for unloading at either the rear or side. The body can also be elevated as shown by the vertical racks so as to use gravity for unloading across sidewalks

is pivoted but a little to the rear of its center so that it takes but little effort in dumping the load.

In the line drawing is shown a special type of body which will dump either at the side or rear, the dotted line showing the range of operation. The body also can be elevated so as to use gravity for unloading across sidewalks. This is one of the newer types of bodies recently patented.

A Packard Example

Anything put out by the Packard company usually is interesting and it is no exception in the case of the windlass type dumping body shown in the illustration. The separate drawing gives details of the operating mechanism used to raise the load.



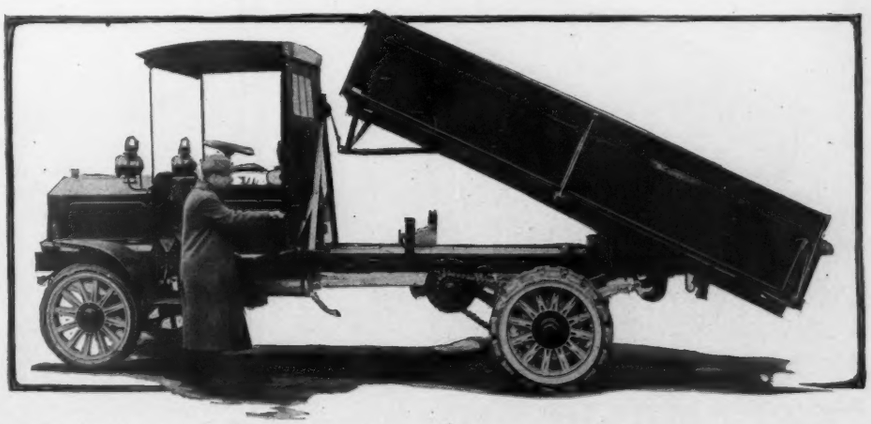
In this case the truck body is pivoted near the rear end of the chassis while forward underneath is a triangular steel frame extending a short distance below the body in the center. Just forward of this is built up a steel frame at the top of which is a grooved pulley. At the bottom of this frame is fastened a short longitudinal shaft having on it a windlass drum and a worm gear, this gear meshing with the worm on the transverse shaft across over the side frame members of the chassis. A crank is fitted on one end of this shaft. The steel cable runs from the triangular frame work under the forward end of the truck body up over the grooved pulley and down to the windlass drum where it is fastened so that, it can be readily seen, by turning the crank at the end of the transverse shaft and thus winding up the cable on the windlass drum, the front end of the body will be hoisted into its upper position.

This type of lifting device has the added advantage in using the worm in that the action is irreversible, so there is no danger of the body slipping down from its "up" position, and there is no need of a ratchet dog or pawl to hold it in any position desired. This construction also has the advantage of simplicity and cheapness in manufacture which always is an advantage in this class of work.

Other Illustrations Given

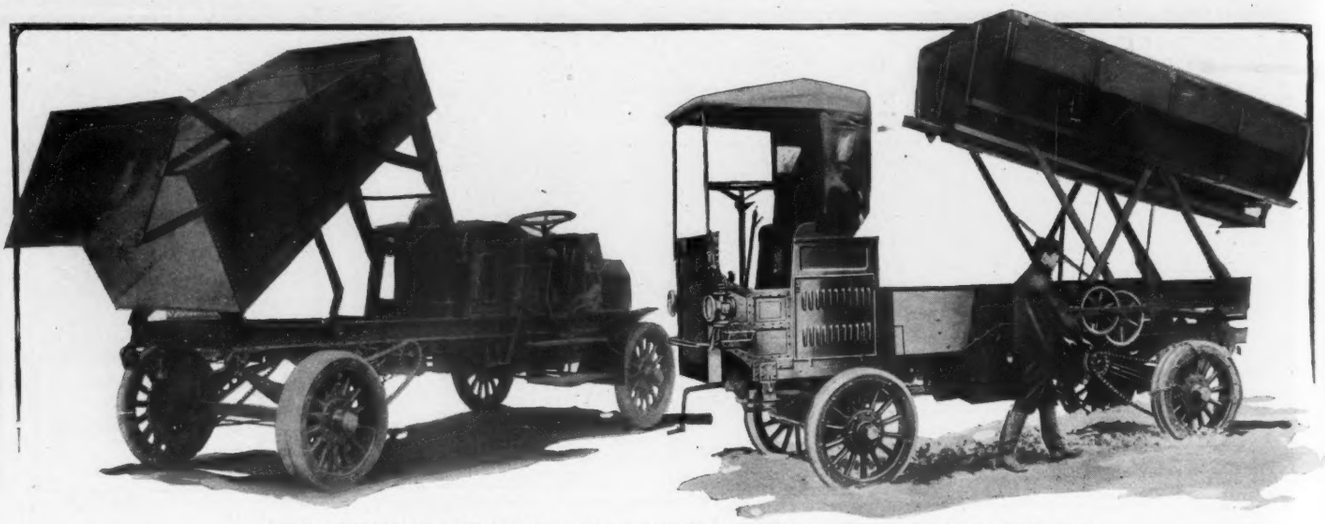
Further illustrations show two types of rear-end coal-dumping bodies for city use, one being an Atterbury 3-ton dumping body truck of the windlass type. In this the entire rear end opens to allow the load to slide out, while the body hinges at the rear to the back cross member of the chassis frame.

How the front end mechanism is arranged is shown in a separate sketch. In this case there are two slide members extending below the body at this end and braced to it at the lower end of which are rings to which chains fasten running up to a windlass shaft above arranged in a steel frame just to the the rear of the seat, and driven from the motor by suitable gearing and connecting mechanism. Though somewhat cumbersome in appearance this arrangement works very effectively and quickly and saves considerable time in the hand cranking of a heavy load, as there is no overhang at the rear with extra weight on the down side to help out



PACKARD WINDLASS TYPE DUMPING BODY FOR DIFFERENT TRUCK CAPACITIES

This is a simple form of a dumping body which hinges on the truck framework near the rear and has the front end elevated by hand-operated windlass. On the truck platform in front of the jackshaft is a cross piece with side guards to anchor the forward end of the body in position. The diagram at the left gives a general conception of the dumping windlass



TWO TYPES OF McFARLAN & CO.'S DUMPING BODIES FOR METROPOLITAN USE

The Atterbury 3-ton dumping body is unique in that the front end of the body is elevated by windlass. The entire rear end opens to allow the coal to slide out. The body hinges at the rear to the truck's frame work

This illustration shows a Reliance 3.5-ton coal truck with an elevating body, with rear delivery. The object of the elevating body is that coal may be unloaded by gravity and delivered across a wide sidewalk to a cellar. The elevation is by hand power

in the lifting; the whole load being practically dead weight.

At the right is shown a Reliance 2½-ton coal truck fitted with an elevating body and rear delivery. The mechanism is similar to what we have described before in a description of the Thomas Wright body. There is suitable reduction gearing between the crank and the lifting mechanism to enable one man to easily lift a load of full capacity. Having no side opening the load can only be released from the rear.

Not the least interesting of the types of bodies illustrated is that of the new Velie pivoted dumping body. In this case there is the usual and suitable mechanism for raising the load preparatory to dumping, but should the street be narrow or the delivery be in an alley where there is no chance to back up to the receiving bin or window, the whole body with its raising mechanism can be swung about on a roller-bearing turn-table to point in any necessary direction, so that while unloading with this type of body, one has the adtantage of the rear delivery with the added advantage of not having to back up to discharge the load, thus saving the probable stoppage of traffic on the street and adding greatly to the range of usefulness of a truck fitted with this type of device.

Truck for Special Service

The Pierce-Arrow municipal type of body was designed for a special service being intended for lightweight loads of large bulk. Owing to the nature of the loads carried an unusual angle of inclination was arranged for in this body, the elevating mechanism being of the windlass type operated by special mechanism. This body is only arranged for delivery of load at the rear.

Besides the dumping bodies there is a wide range of usefulness for the hopper or gravity door types as shown in the illustration of the Commer fleet of coal trucks in railway service in New York. Where there is no need for elevating the load these bodies work admirably and discharge a load of 3 to 5 tons in from 4 to 6 minutes.

There are many cases where a dump body will not fit the work where other types are demanded. Pocahontas coal for instance, used so largely in Chicago, will not flow except at too steep angles to be applicable to the ordinary motor truck body. Again, most of the coal delivery in the narrow streets of this city must be accomplished under circumstances which will not permit of a long dump body. Yet with the power that always is at the command of the driver whose truck is standing still, why is it not possible to devise some type of conveyor which will be applicable to motor truck requirements, so that instead of shovelling the load into a window 6 or 8 feet up as in the public schools, the power will be put to work to raise and deliver the load in a fraction of the time of other systems possible for the conditions at present?

VELIE PIVOTED DUMPING BODY

A characteristic of the Velie dumping body is that the body is swung through a 90 degree angle on the truck platform. When this is done one end is elevated, as shown, to furnish a gravity flow

PIERCE-ARROW MUNICIPAL TYPE BODY

This body is specially designed for health department work in cities. It is specially deep, being intended for light-weight and bulky materials. The body hinges at the rear and dumps by means of a

Loading Systems a Factor in Making Motor Trucks Pay

FULLY as important as the unloading advantages of the dumping bodies, are the systems which make for quick loading of motor trucks. As in the case of dumping bodies, there are many different methods each suited to certain conditions and none suited to all. The individual requirements of each case must be taken into account in the choice of a loading system as in anything else.

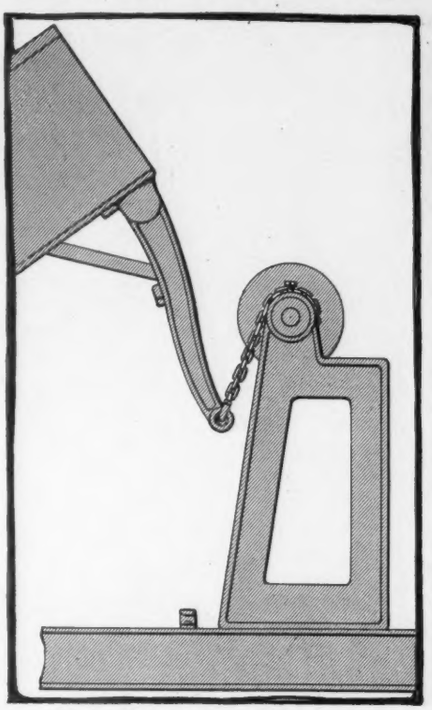
If a coal company uses a dump body for unloading obtaining the increased efficiency which has been shown and still loads that same body by hand shovelling it is still far from an efficient system in truck service. A delay of 20 minutes in loading naturally is as important as a delay of similar length in uuloading.

Department Stores Losers

The department stores of Chicago are great losers through this very factor, for few of them load, or try to, under an hour and a half or 2 hours, the big trucks making but two trips a day, with three on Saturday.

This, in the case of the Fair for instance, shows an actual running time on the road of 3 hours per day, the truck being idle the rest of the time.

By a proper arrangement, or rather a different arrangement, of running schedules half the number of trucks now used would do the work of the present equipment. These stores figure that the keeping of a strict schedule, however, for their outlying deliveries is worth the difference. This does not alter the fact of the loss being there, however, in the idleness of the truck. Two hours is allowed by the Boston store for the loading of its truck. By using a loading system by chute, for instance from the second floor, a scheme which has been used with success elsewhere, the truck could be filled in half an hour. The difference in time would allow an extra trip between present runs. The Boston store and the Fair load in bulk, the bundles being taken to the sidewalk next to the truck on small-wheeled crates, and from them loaded into the trucks by porters. This fact is responsible for a large part of the time consumed in loading.



ATTERBURY 3-TON DUMPING BODY

In this dumping body the forward end is supported on a pair of curved feet to the lower ends of which attach chains that pass over a windlass supported on the truck frame. The rear end of the truck body hinges to the frame

Marshall Field & Co. use the trunk system in loading, the bundles for each route being locked in a separate trunk. With these ready it takes but 10 minutes to load, and at the other end the problem of separating the packages to their different routes is materially simplified.

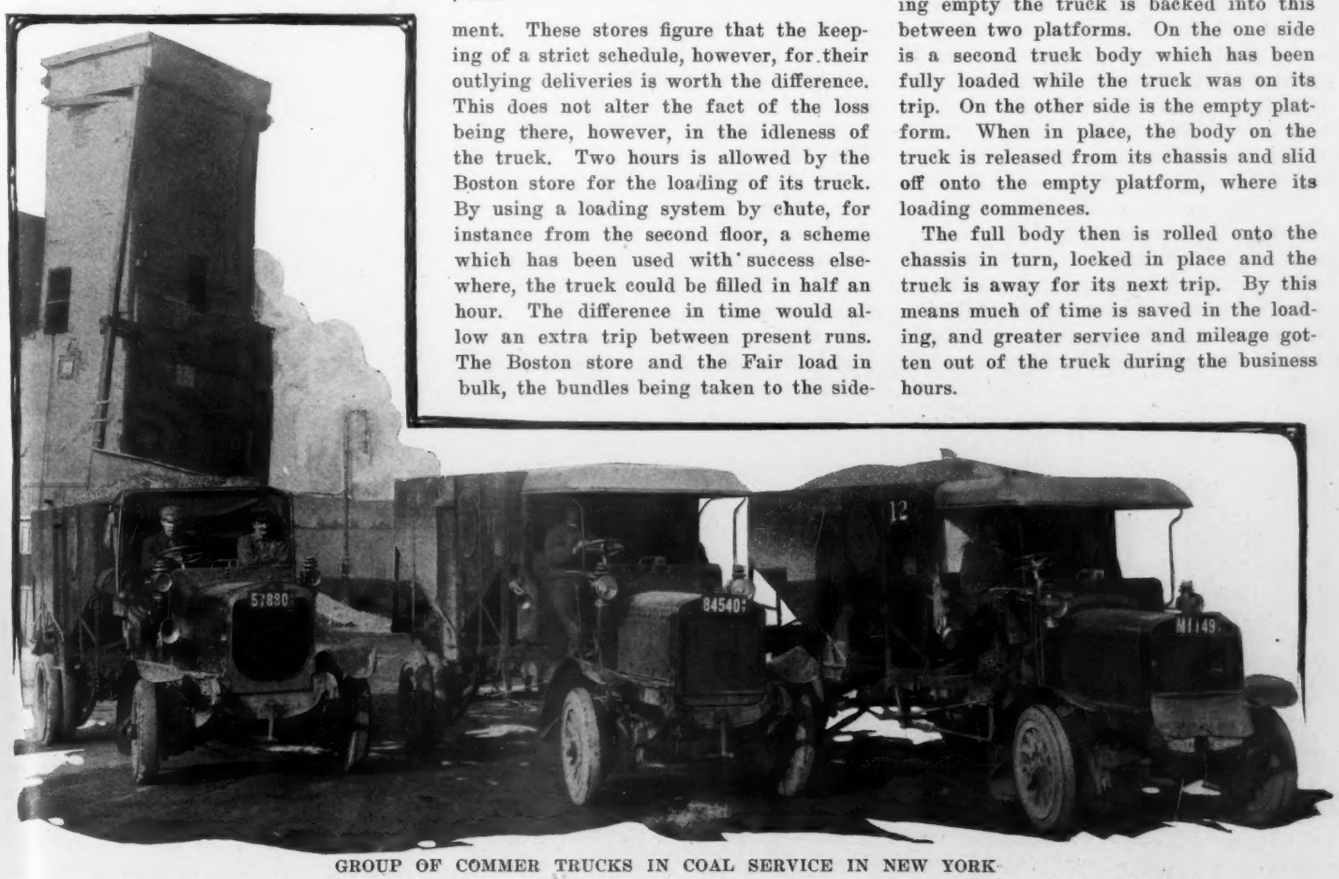
Carson, Pirie, Scott & Co. use a trunk system also, canvas crates being used for the nearer stations and steel trunks for those further out. In this way the load can be quickly picked out for its proper destination at each station without danger of taking goods meant for the next stop. The unloading of a truck by this system of handling in trunks takes but 10 minutes.

Wanamaker System

Wanamaker in New York uses a crate system, where the whole bulk load is put into one large crate awaiting the arrival of the truck. With this the empty crate is slipped out of the truck body and the full one slid in, a crane being used for a large part of the handling. This firm also keeps its trucks in operation 20 hours out of the day, using three shifts of men.

Another system provides a sort of dock for the incoming truck. Arriving empty the truck is backed into this between two platforms. On the one side is a second truck body which has been fully loaded while the truck was on its trip. On the other side is the empty platform. When in place, the body on the truck is released from its chassis and slid off onto the empty platform, where its loading commences.

The full body then is rolled onto the chassis in turn, locked in place and the truck is away for its next trip. By this means much of time is saved in the loading, and greater service and mileage gotten out of the truck during the business hours.



GROUP OF COMMER TRUCKS IN COAL SERVICE IN NEW YORK

These trucks are all fitted with the gravity floor coal wagon the same as used in many railroad cars. Delivery of coal from the body is at the side, as will be noticed in the illustration

Happenings in the Industry and Sport

Annual Report of Packard Company Shows Net Profit of 14 Per Cent—Federal Buys Van Dyke Plant at Detroit—Case Increases Capital Stock to $40,000,000 —Lauth-Juergens After Branch Factory

DETROIT, MICH., Jan. 8—A net profit of 14 per cent on the capital stock of $10,000,000 is shown by the annual report of the Packard Motor Car Co. for the fiscal year ended August 31, last, which was made public Saturday. President Henry B. Joy, in his report to the board of directors, says:

"Business transacted has been gratifying in volume, the method in which it has been handled shows a marked increase in working efficiency. The capital and surplus investment at the beginning of the fiscal year was $11,927,611.54. The net gain for the year was 11.8 per cent, or $1,406,410.27. The net profit yielded on the capital stock of $10,000,000 was 14 per cent. Wages have constantly increased during the year and are higher than ever before.

"The finances of the company are in good condition. To insure a continuation thereof against any exigency, it was recently considered wise to fund the floating debt of the company into short-time debentures, extending over a period of 5 years, but subject to call."

The general balance sheet shows resources of $16,110,756.28, of which $8,265,845.82 is credited to plant after the deduction of $572,001.17 for depreciation. The real estate, listed at cost, amounts to $283,707.45; buildings, $1,945,849.72; machinery, $1,061,623.72; equipment, $1,011,160.76; rights, privileges, franchises, patents and inventions, $3,412,958.89; investment in branch houses, $1,272,410.48; stock, material and finished product, $5,202,887.77; current assets, $1,160,474.71. Under liabilities are listed bills and accounts payable, $2,858,265.33; reserve for depreciation, taxes, interest and insurance, $268,469.14; surplus, $2,984,021.81.

The financial statement of Philip H. McMillan, secretary and treasurer, shows receipts from all sources to have been $13,166,533.68; disbursements, $13,650,528.25; cash on hand at the close of the year, $166,971.53 as against $650,966.10 on September 1, 1910.

During the year the company paid out of earnings, for additions to the plant, $893,829.36. The company completed and moved into fireproof service and sales buildings in New York and Philadelphia, and closed a long lease for similar quarters in Chicago. The service depot in Paris also was extended.

Some of the interesting facts concerning the Packard plant, shown in the report, are as follows: Floor space, 1,642,212 square feet, or 37.7 acres; maximum number of employes during the year, 7,575; maximum monthly payroll, $524,407, in August. Buildings completed since the close of the fiscal year or now in construction will increase the capacity of the foundry 50 per cent; truck department, 200 per cent in floor space and capacity, and service department, 50 per cent in floor space.

FEDERAL BUYS VAN DYKE PLANT

Detroit, Mich., Jan. 5—The Federal Motor Co. has purchased the plant, machinery and equipment of the Van Dyke Motor Car Co., which recently went into bankruptcy, and the sale has been confirmed by the court. The company pays $20,000 cash and assumes a $35,000 mortgage. It is moving already and expects to have the factory running full blast in 10 days. This gives the Federal company a capacity of 1,000 cars per year and there is ample room for extensions. The plant is located at Junction and Leavitt avenues, in close proximity to the Grand Trunk, Michigan Central, Lake Shore and Wabash railroads, with two sidetracks running into the yards. The building is 60 by 512 feet, the front portion being two stories in height, and there are three and one-half acres of ground. There is a power house large enough to take care of another building as large as this. Both the main building and the power house are of modern construction and the machinery and equipment are in good condition.

REPUBLIC MAKES APPOINTMENTS

Youngstown, O., Jan. 5—John H. Kelly, formerly manager of the Chicago branch of the Republic Rubber Co., has assumed his new duties as manager of tire sales, while F. P. Best, formerly New England manager for the company, has been appointed manager of mechanical sales. In connection with these appointments President Thomas L. Robinson announces: "During the absence, through illness, of Mr. Lomasney, vice-president and general manager, Mr. Kelly will be in full charge of sales in all tire departments, and Mr. Best of the sales in all mechanical departments. In the latter work Mr. Kelly also will be associated with Mr. Best in an advisory capacity. H. W. Bixler continues in the capacity of assistant general sales manager."

CASE INCREASES STOCK

Racine, Wis., Jan. 7—The J. I. Case Threshing Machine Co. announces that it has increased its capital stock from $5,000,000 to $40,000,000 and that it will add several new lines to its already big output of farm machinery and engines. The details of the expansion policy and what it will include has been held in reserve by the officials of the Case company, but it is generally known that a new gas tractor will be put on the market in 1912. The Case gas engine experts have been at work on the new product for some time, experimenting and testing and now it is claimed the new tractor is ready for marketing.

Several additions will be made to the big plant of the Case company in addition to those already in the course of building. The new gas tractor home will be one of the most complete in existence and will be finished in 1912.

Banking interests friendly to the Case company have encouraged the expansion policy and the floating of the first $20,000,000 of Case common and preferred stock excited more than passing interest.

BUS PLANT PROPOSED

Detroit, Mich., Jan. 7—It is reported that A. T. O'Connor and John Utz, well known in local motor car circles, are negotiating with eastern and Detroit capitalists for the establishment of a plant here to manufacture motor buses similar to those now in operation in New York and to put them in commission on the city streets. Mr. Utz is already at work on a design. With the present congested condition of the traffic, there seems to be little doubt that such a line would pay here, even on a 5-cent fare, the rate that has been suggested. Rumor has it that the negotiations have progressed so far that the promoters are looking for a site. The plans contemplate a two-story bus with a seating capacity of eighty persons.

ENTERS TRUCK-MAKING FIELD

Flint, Mich., Jan. 7—Announcement is made that the Durant-Dort Carriage Co., one of the largest manufacturers of vehicles in the country, will enter the motor car field by adding to its line of products a new type of delivery car which has been perfected after a year of experimenting. The new car is equipped with a two-cylinder, friction-drive engine and has a carrying capacity of 500 to 800 pounds. It will be made in three models.

PUEBLO HAS TRUCK PLANT

Denver, Colo., Jan. 7—The Byron Motor Co., of Denver, has purchased 10 acres of ground in the heart of the manufacturing district of Pueblo, where it will begin the construction of commercial trucks for delivery purposes. The building which already is on the premises was formerly occupied by the Steel Wheel and Wagon Co.

and is admirably suited to the needs of the Byron company. Its dimensions are 300 by 85 feet, with power house, foundry and other out-buildings. The company selected Pueblo because of its advantageous location on five railways, and the ease with which its product could be shipped east and west.

It is the intention of the company to build from 300 to 600 trucks in 1912 and greatly to increase its capacity in the following year.

LAUTH AFTER BRANCH PLANT SITE

Toledo, O., Jan. 6—If present plans are consummated the city of Gibsonburg, O., soon will have a branch factory of the Lauth-Juergens Motor Truck Co., of Fremont. H. S. Diller, sales manager of the company, is working in conjunction with the commercial club in the sale of stock for this purpose. If stock to the amount of $50,000 can be sold the concern will erect a factory 60 by 200 feet for the manufacture of trucks. A mass meeting was held yesterday in the opera house and it is expected to dispose of the stock within 10 days.

NEW TRUCK ENTERPRISE

Columbus, Ohio, Jan. 5—F. W. Dickinson, who some time ago incorporated the Antomobile Co., of Columbus, Ohio, with $50,000 capital stock, has brought it into actual being by leasing a plant at 1181 Parsons avenue and electing the following officers: F. W. Dickinson, president; William Caskey, vice-president; Frank Lodeman, treasurer; A. F. Dickinson, secretary. The company proposes manufacturing an extremely light delivery wagon which is wholly unlike any of those now in use. It really consists of a body suspended between two steel tube motor cycle frames, and employs wire wheels and other motor cycle characteristics. It mounts a 5-horsepower motor.

ANOTHER TRUCK DEMONSTRATION

Boston, Mass., Jan. 6—Under conditions somewhat similar to those which governed its advent in Boston when it made a midwinter run from the New York show to Boston, a 1½-ton Decatur truck started yesterday for New York with a load of oil for the Standard Oil Co. The fact that there was a heavy snow storm in progress did not deter the officials of the company in starting the truck, in fact they welcomed it. On reaching New York the truck is to start on an official non-stop motor run in that city simultaneously with the opening of the palace show and it will continue throughout the entire week that the show is in progress.

TO MAKE A CARBURETER

Beloit, Wis., Jan. 5—Local capital is being interested in a company which intends to produce and market a new carbureter designed by W. C. Westaway of the W. G. Wheeler Co., Beloit, Wis. The carbureter is especially adapted for the use of kerosene oil, although gasoline and benzine may be utilized.

Echo of Selden Patent

Decision Sustaining Demurrer of Kopmeier Company of Milwaukee in Suit Brought By Velie Is Sustained By Court of Appeals at Chicago

CHICAGO, Jan. 7—The decision of the late Judge Joseph V. Quarles, of the United States district court of Milwaukee, sustaining the demurrer of the Kopmeier Motor Car Co., of Milwaukee, in the suit of the Velie Motor Vehicle Co., of Moline, Ill., has been upheld by the federal circuit court of appeals at Chicago. The suit of the Velie company was for $50,000 damages and included as defendants fifty-seven manufacturers then members of the A. L. A. M., with the Kopmeiers as co-defendants, alleging conspiracy in restraint of trade and intimidation of dealers. In addition, breach of contract was charged against the Kopmeier company.

The suit grew out of the refusal of the Kopmeier company to display Velie cars in company with other cars as represented, at the 1910 Milwaukee motor show because, it is alleged, of the conflict with licensed cars. The decision of the Chicago court is taken to mean a termination of the entire action, which was instituted in the circuit court of Milwaukee county early in the spring of 1910.

MINNESOTA LAW IN EFFECT

Minneapolis, Minn., Jan. 5—Minnesota's new motor and vehicle law became effective last Monday. Use of the tags for licensed cars began December 1, as the secretary of state ruled that purchasers in the last month would not be required to buy 1911 numbers.

Under the new law are the following important changes: Registration is for 3 years; two license numbers must be on each car, front and rear, bearing the dates 1912, 1913, 1914; registration fee, $1.50 for the 3-year period; local regulations of speed different from state law forbidden, except on parkways, where the speed limit shall be conspicuously displayed on signs; taking machine without owner's permission is felony, punishable by confinement in state prison; tampering with machine or its devices is forbidden; chauffeurs must be more than 18 years old and must pass a license examination, the board being created by the law; chauffeur's license revoked on third conviction; persons under 16 years old driving a motor car must be accompanied by licensed chauffeur; violators of motor laws are entitled to immediate hearing, $25 bail or release on leaving machine; muffler must not be cut out in limits of city or village; motor vehicles must not be left standing on the street unattended with the motor running; non-residents allowed 30 days in the state without Minnesota license; failure to stop after accident to leave address is gross misdemeanor; motor cars must carry, between from 1 hour after sunset to within 1 hour of sunrise white light in front, visible 200 feet, and rear lamp showing red; all vehicles other than motor vehicles shall carry a white light front and rear.

After providing that speed shall be "reasonable and proper," having regard for traffic conditions and use of the highway or as endangering life and limb, the provisions call for the usual 10, 15 and 25-mile limits.

WILL ACCEPT ROAD DECISION

Baltimore, Md., Jan. 6—The Baltimore county commissioners have decided not to take an appeal from the decision of Judges Burke and Duncan, of the circuit court of Baltimore county at Towson, that the $1,500,000 county road loan is void. This conclusion was reached after Judge Burke had given a lengthy hearing to leaders of the good roads association of the county. The commissioners explained that they thought the court of appeals would sustain the verdict of the lower court and that they hardly could gain anything by an appeal.

MICHIGAN'S ROAD WORK

Detroit, Mich., Jan. 7—State Highway Commissioner T. A. Ely has prepared a report, which he has submitted to Governor Osborn, showing that 850 miles of good roads have been built in Michigan by the aid of state rewards since the highway department was established July 1, 1905. On this mileage there has been paid $585,290 in state rewards. Of the 850 miles, 514 were gravel and 313 macadam. In addition there are 600 miles either in course of construction or just completed, on which the rewards are still pending. The road-building operations have greatly increased the past 2 or 3 years. During the year ending June 30, 1911, there were 304 miles of road constructed.

BAY STATE A. A. IN GOOD SHAPE

Boston, Mass., Jan. 5—The annual meeting of the Bay State A. A. was held January 1, and was attended by seventy-five members. The financial report showed that during the past year not only had the many debts hovering over the club been paid off, but that there had been a gain so that the new year starts with a balance in the treasury. Secretary C. P. Rockwell's report showed that the membership had been increased from 154 to 306 during the past year. As a result of what had been accomplished by the officers the entire list was re-elected for the present year and many were given an unanimous vote of confidence. These officers include president, E. A. Gilmore; treasurer, J. S. Hathaway; secretary, C. P. Rockwell; Harry W. Knights, vice-president; directors, A. B. Henley, Burton G. Ellis, M. H. Gulesian, Horace G. Kemp and Chase Langmaid. R. A. Dobbyns was reappointed assistant secretary.

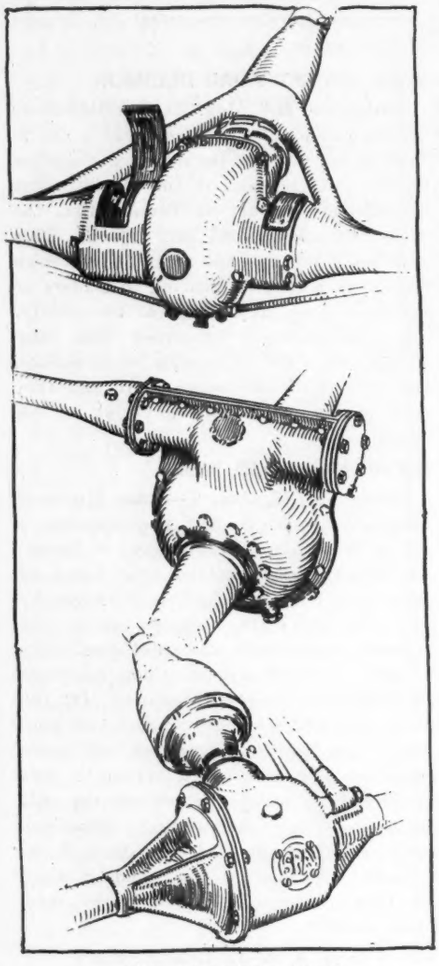
Importers' Salon Good Business Show

NEW YORK, Jan. 10—Special telegram—Concluding a successful show period the eighth annual importers' salon came to a close tonight at Hotel Astor. The variety and completeness of the exhibition never was rivaled by previous salons, seventeen different makes of foreign cars having been on exhibition. Each stand did some business and it is probable that in total volume it was not far from the top notch. The shows of the importers are diametrically different from the American shows in New York, being much more largely a market.

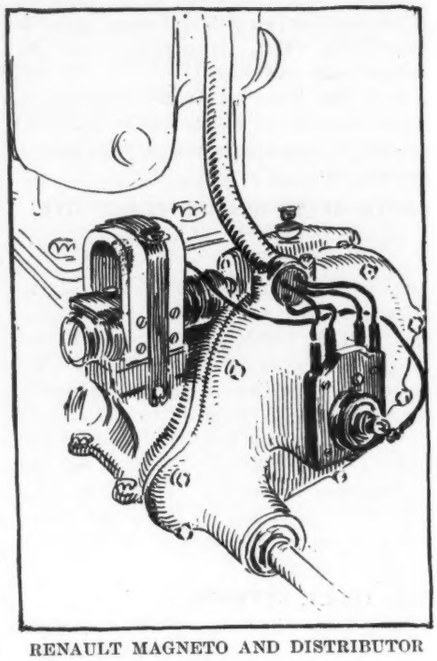
A considerable number of visitors from various sections of the country attended the salon and more or less out of town buying was reported. The retail agency of the Mercedes line has been taken over by the Paul Lacroix Automobile Co.

Judged by the standards of the other New York shows, the attendance at the salon has been small, but general satisfaction is expressed by all the exhibitors with the results attained after the week's exhibition.

The Importers' salon served as an interesting field of study for many of the show attendants who came with the object of comparing foreign construction with American. So far as the general finish of the chassis is concerned, there is shown an utmost amount of care in the finish of the small parts. Sometimes the design of brake connections seems carried to a fault, but in every case the reason advanced is that it is all done with the object of preventing rattling and making the brake absolutely dependable. An example of this is the Renault foot-brake, which is a clamping band type consisting of two semi-circular shoes. The bands are contracted by an S cam on the end of the operating rod. This rod rotates, and passes through the gearbox, the brake being located at the back of the gearset. Between the forward end of this brake rod and the pedal are fearfully worked out connections with ball-and-socket unions. Similar care is shown in Benz clamping type of foot brake. The illustration shows the use of ball-and-socket connections. A factor of this brake is a wing nut for adjustment. This is easily operated and very accessible.



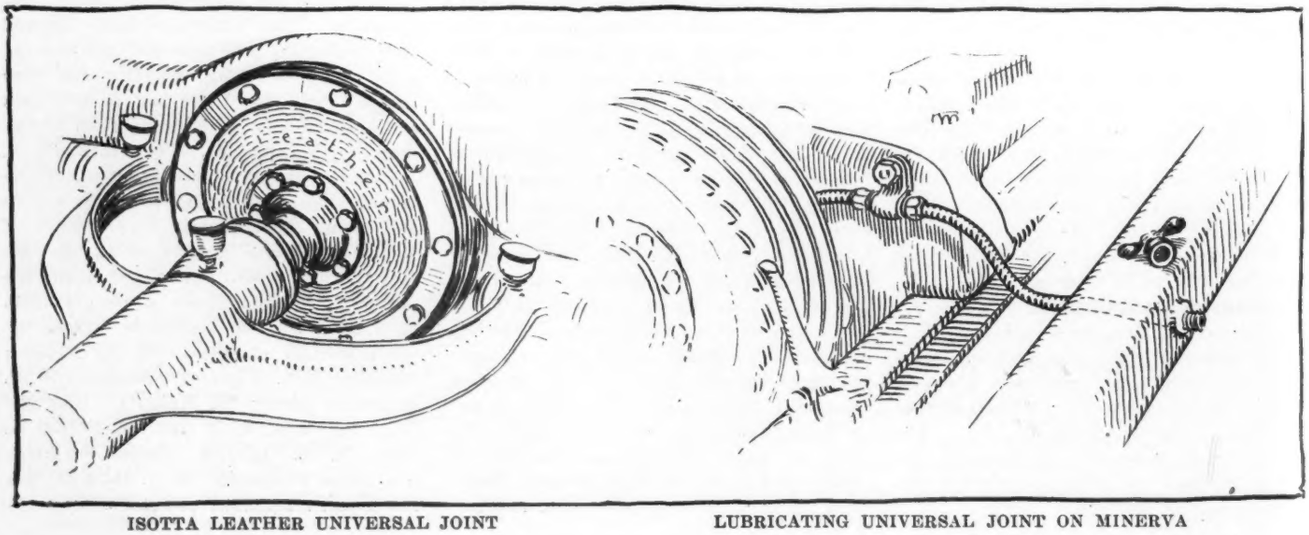
PEUGEOT REAR AXLE
MINERVA REAR AXLE
S. P. A. REAR AXLE



RENAULT MAGNETO AND DISTRIBUTOR

On the new Panhard-Knight models the rear wheel brakes are applied through long metal ribbons instead of the usual brake connection rods. These ribbons pass through roller guides on a cross member of the frame. Provision for adjusting the length of the ribbon is shown in the circular diagram.

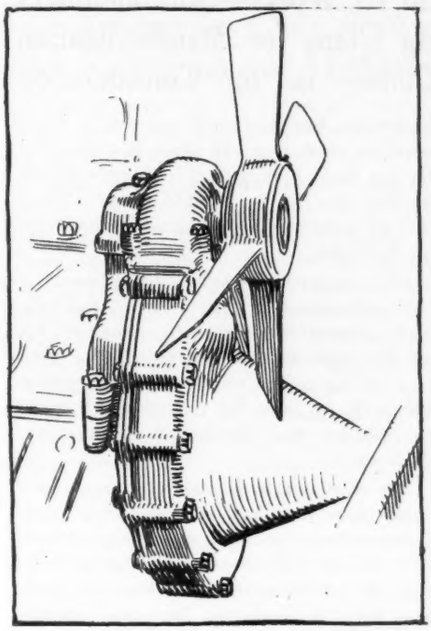
Versatility of foreign design is shown in the rear axle construction. On the Peugeot a semi-diamond shaped housing is used, this construction providing a good receptacle for the differential housing and also giving rigid support to the bearing in front of the pinion on the propeller shaft. The employment of curved caps for inspection purposes is shown.



ISOTTA LEATHER UNIVERSAL JOINT

LUBRICATING UNIVERSAL JOINT ON MINERVA

Features Noted on the Foreign Cars



DE DION CHAIN DRIVE FOR FAN

The Minerva, a Belgium product, uses worm drive for the first time and mounts the worm above the wheel. This gives a horizontal position to the propeller shaft. The entire housing is a two-part one, with a fore-and-aft vertical division. The propeller shaft is encased throughout its entire length, the rear end of the enclosing tube bolting to the rear axle housing.

A somewhat novel differential housing construction is the S. P. A. The housing is in two parts, one a cup-shaped piece which contains the differential gear, and the other a heavily ribbed end plate which bolts to the cup-shaped portion. This construction gives the differential housing a strong design, and makes it as accessible as when the division is in the center.

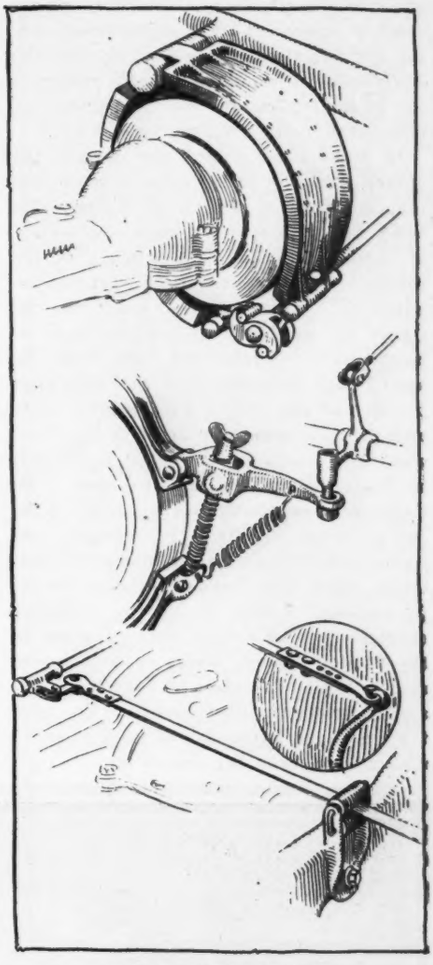
More than ordinary care is shown in the universal joints on many of the cars. One example of a novel type is the Isotta, which is a leather disk as illustrated. This disk is clamped between a central or hub flange and peripheral flanges. The hub flange connects with the propeller shaft and the peripheral flange with the gearset shaft. This joint has been thoroughly tried out and is claimed to have given entire satisfaction.

On the Minerva chassis there is a neat job in the lubrication of the universal joint back of the gearbox. A metal tube extends from the side member of the frame in between the gearbox and the propeller shaft brake, thus entering the universal joint housing from in front. To lubricate the joint a threaded cap is removed from the outer end of the metal tube and the grease gun threaded on. One charge of the grease gun suffices for the joint. The reason for using a grease gun instead of placing a grease cup is that the latter appears ungainly on such an exposed part of the car.

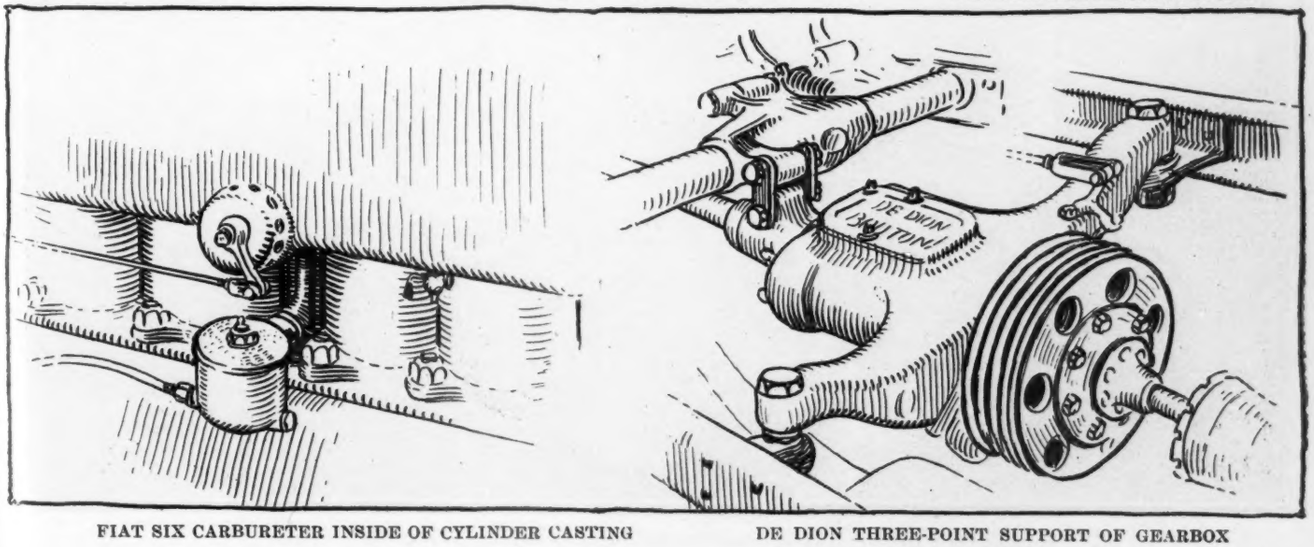
The use of three-point suspension is gaining, a typical example being the gearset of the new eight-cylinder de Dions. As illustrated, the forward support is a fore-and-aft hinge, on a tubular cross member of the frame. The two rear supports are on short brackets mounted in the side members of the frame. The use of the air-cooled foot-brake drawn at the rear of the gearset is characteristic of foreign construction.

The incorporation of the mixing chamber and throttle of the carbureter in the monobloc of the new six-cylinder Fiat is illustrated. The external float chamber is shown with its side connection leading to the nozzle which is mounted between the third and fourth cylinders. The end of the cylindrical throttle is also shown, as are air entrances.

The use of silent chains to drive camshafts, pump shafts, and magneto shafts is constantly growing. With no other French maker is this so conspicuous for 1912 as with de Dion. An illustration shows the housing for the silent chains to drive the fan on the forward end of the eight-cylinder motor. The fan is a neat one-



RENAULT FOOT BRAKE
BENZ FOOT BRAKE
PANHARD BRAKE CONNECTION



FIAT SIX CARBURETER INSIDE OF CYLINDER CASTING

DE DION THREE-POINT SUPPORT OF GEARBOX

piece construction. In this motor the cylinders are in two block castings of four each, mounted in V form. One magneto is used. It is mounted in the angle of the V at the dash end of the motor and, like the fan, is driven by silent chain.

Renault is the only example of a foreign make which uses a distributor which is separated from the magneto. This is tersely illustrated. The magneto is on a short transverse shaft, being compactly and accessibly positioned between the front casting and the timing gear housing, and the distributor is mounted on the forward end of the crankshaft. The arrangement is noteworthy because of its accessibility.

In looking over the body designs the observer is forcibly impressed with the preponderance of the cowl or scuttle dash. With American cars the dash is generally of conservative size, but on many of the foreign types size has been cast to the winds, and while the new types are designed for comfort, they are also made to harmonize excellently not only with the hood design but also with the remaining portions of the body. The Renault dash, owing to its incorporation with the radiator, is naturally heavy, but it is eclipsed by that used on the Metallirgique. The Panhard is especially heavy cowled type, and so is the Pic-Pic. The foreigner has made much advance in the matter of dash lamps, these very frequently being entirely enclosed within the dash. Another characteristic of several foreign types is the flat-top fender, which is with many makers taking the place of heavily-beaded and elaborately-curved designs. The new types give the impression of made to serve rather than made for decoration.

Engineers Prominent During Shows

Interest Shown in Association and Its Works—Subcommittees Actively Engaged in Formulating Plans for Standardization of Parts—Electric Lighting Comes in for Consideration

NEW YORK, Jan. 10—Special telegram—The preliminary work of the Society of Automobile Engineers for its annual session January 18, 19 and 20, in Madison Square garden during the closing days of the commercial show, is of such a nature that it augurs well for the session.

Without question much advancement is going to be accomplished. The interest is greater than ever before, and the different sub-standardizing committees, which have been meeting practically every day this week and will have sessions practically every day next week, are accomplishing much. They are filled with heated and in some cases violent discussions, which often are necessary to produce good results.

The annual dinner of the society scheduled for Friday, January 19, Hotel Astor, is meeting with general approval. Last year 330 attended this dinner. This number will be eclipsed this year, as more than 200 requests already have been received.

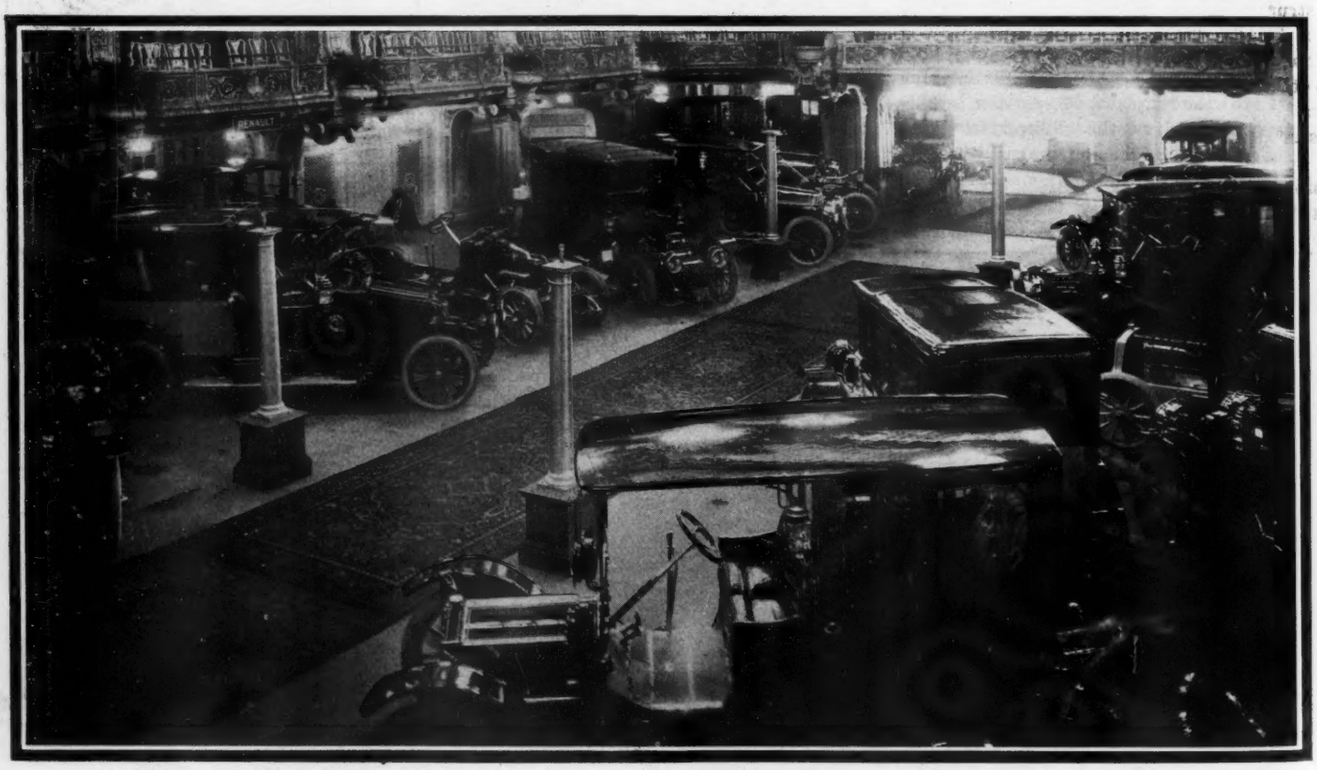
The most interesting subcommittee work to date is that of the iron and steel standardizing division. Last June at the midsummer session at Dayton, O., much heated discussion was provoked between the different steel interests over the steel specifications that were passed upon by the general standards committee. The subcommittee has this week had two or three sessions, steel, iron and other specifications having been revised and new ones added, so that the list is of wide range. There will be more sessions of this subcommittee on Saturday.

Most important work is being done by the subcommittee on electric lighting. This committee represents many of the electric light manufacturers. In its work it is taking up the matter of standardizing the style of base for incandescent lamps for car use and also standardizing voltages, etc.

The sheet metal division has prepared a comprehensive report on the use of nonferrous alloys for sheet materials, tubings, etc. In the ball and roller bearing division the matter of tolerance has been gone into and the committee has some definite reports to make in this matter.

An important meeting on Friday is that of the truck standardization subcommittee. One of its problems is arriving at some basis of rating truck capacity. At present some makers sell a truck for 2-ton, and also sell the same chassis for 3 or 3½-ton. The committee hopes to define something definite on this rating capacity question.

As a final matter in the various preliminary work of the standardization com-



APPEARANCE OF THE IMPORTERS' SALON HELD IN HOTEL ASTOR, NEW YORK

Designers Listen to Experts' Views

Professor Hutton Talks on Carbureters for Benefit of S. A. E. at Automobile Club of America—Charles Manly Tells of the Fine Points of Hydraulic Transmission Invented by Him

mittees, there will be a general meeting Tuesday, January 16, of the entire standards committee.

New enthusiasm was thrown into the S. A. E. circles today by the arrival from England of H. F. Donaldson, nominee for president of the society for the coming year. Mr. Donaldson went abroad with the engineers on their European visit the end of October and since then has been studying commercial vehicle conditions on the other side.

Mr. Donaldson, in speaking of his impressions on the commercial vehicle situation abroad, said: "I was somewhat disappointed at the present status of the commercial vehicle in Europe, when viewed numerically, as I had anticipated that in London and Paris many more would be in operation, but there seemed to be many reasons why this is not so. In London the excessive traffic slows the speed of the vehicle so much that the efficiency is greatly curtailed."

ENGINEERS HEAR LECTURES

New York, Jan. 9—Two interesting courses marked the first meeting arranged for the entertainment and benefit of the Society of Automobile Engineers during the New York motor car show season. These were by Professor Hutton, dean of Columbia university's college of engineering, on the subject of carburetors; and by Charles M. Manly on his hydraulic transmission.

The meeting, while primarily a technical evening of the Automobile Club of America, was largely attended also by members of the Society of Automobile Engineers, invited as guests of the club.

Professor Hutton's lecture was given in a simple way that made it a technical subject elementary enough to be interesting to anyone having only an ordinary knowledge of the principles of the internal combustion motor, such as used in the motor car.

Not the least interesting part of Professor Hutton's lecture was the illustration by a piece of special apparatus designed to show the working of the carbureter jets in the beam of light in a projecting lantern, so arranged that the action was made visible upon a screen. The mixing of proportioning jets were of glass. The cell, or chamber within which they worked was connected to a vacuum system through a controlling throttle valve. The apparatus showed upon the screen the effect resultant when the fuel issued from the jets by suction mixed and atomized with the current of air was carried away by the suction of the two cylinders. The effect of insufficient air supply was very plainly shown, the mixture becoming too rich and the combustion in the cylinder being incomplete.

For safety in the experiments a non-inflammable fluid was used consisting of water, colored with the deep purple of permanganate of potash.

Charles M. Manly is the inventor of the new Manly hydraulic transmission now being used in this country on two makes of commercial motor vehicles, one of which is the Remington. In this form of transmission there is a hydraulic pump directly connected to the crankshaft of the engine, and so connected to this by suitable high pressure piping two hydraulic motors, which in turn are connected to the rear driving wheel by the usual driving chain and sprocket combination. The main pump is so constructed that its stroke can be varied from no stroke to maximum, even while rotating at any speed. Thus the oil in the connecting pipes and the two hydraulic motors is circulated to the extent determined by the length of stroke of the main pump, so that it is this adjustment of stroke which regulates the speed of the vehicle. Thus there is a range of speed in the vehicle infinitely variable from zero to maximum without the use of any gearing.

Since the speed of the vehicle is dependent upon the stroke of the main pump it will be seen that the torque or pulling power increases in exact proportion to the decrease in speed, so that an effect is produced in range of action and gear ratio as variable as in a friction drive but without many of its limitations. The performances of this novel transmission system will be watched with interest.

LOOKING DOWN CENTER AISLE OF THE IMPORTERS' SHOW AT THE ASTOR

TUNGSTEN LAMPS FOR CAR LIGHTING

CLATONIA, NEB.—Editor Motor Age—Will you inform me through the Readers' Clearing House columns of Motor Age:

1—How to find the voltage of a tungsten lamp and determine the difference between a 1½-volt, a 3½-volt and a 4-volt from a 6 volt?

2—How to find the candlepower and determine the difference between 2 candlepower and 4 candlepower, 8 candlepower and 10 candlepower?

3—I have a bridge for finding the resistance of a voltmeter and an ammeter. I have also a 12-volt dynamo that will furnish 6 amperes of current. Could I connect the lamps in series and use 6-volt lamps, and how many?—F. W. Jones.

1—In order to find the voltage of Tungsten lamps for motor car lighting would say that the simplest way is by the cut-and-try method rather than by any actual measurement. For instance, if you have at hand a storage battery by which you can get the three steps of approximately 1½, 3½ and 6 volts, that is with a 3-cell storage battery, the proper voltage of the lamp can be very nearly ascertained. Connect the lamp first to one cell of the battery and if it does not give the normal brilliancy, to two cells in series, and finally, if it does not give full light, try on the full 6 volts of the battery. Should you find that on any of these three combinations the brilliance is abnormal disconnect quickly in order to avoid burning out the filament. In this latter case the voltage is too high.

2—The only way to determine the candlepower of a lamp to any degree of accuracy is by a photometer method. That is, you must compare the light cast by the lamp under test with some lamp whose candlepower you know. If you know the voltage upon which the lamp is designed to be used you can determine its candlepower by the current it consumes. Either by means of the ammeter or by testing for resistance by the Wheatstone bridge. Tungsten lamps take from 1 to 1.5 watts per candle; that is, a 1½-volt lamp which is designed to give about .5 candlepower consumes .6 watt and takes a current of .4 ampere. A 3½-volt lamp usually gives 1½ candlepower and consumes 1.05 watts; that is, takes a current of .4 ampere. The 6-volt lamps usually run from 4 to 12 candlepower and consume about 1.5 watts per candle.

3—The 12-volt dynamo can be utilized to supply the 6-volt lamps by wiring them in groups of two in series.

THE IDEAL CAR

Chicago—Editor Motor Age—Who will be the first to build the ideal car and thereby win undying fame and countless ducats?

The essentials of the ideal car are:

1—A valveless motor; eliminating working parts, leakage, noise and nuisance.

2—An air-cooled motor, eliminating weight, boiling and freezing.

3—A friction drive, eliminating cost, complication, grease and grind.

4—An airless tire, eliminating expense, perspiration and profanity.

Several cars have one of these essentials; not a car has them all. Why? Because capital is heavily invested in parts that are now antiquated.

Will the public always stand for tax, discomfort and annoyance caused by such antiquated equipment? Not on your life. It has paid liberally, prodigally for new patterns all these years. It is entitled to the latest, not only in part, but in whole.

The manufacturer who builds the ideal car according to these specifications will sell half a million to farmers the first year—if he can supply them. He also will congest the channels of trade with discarded second-hand cars with the antiquated parts.

Experimentation at the expense of the public has had its day. It was necessary.

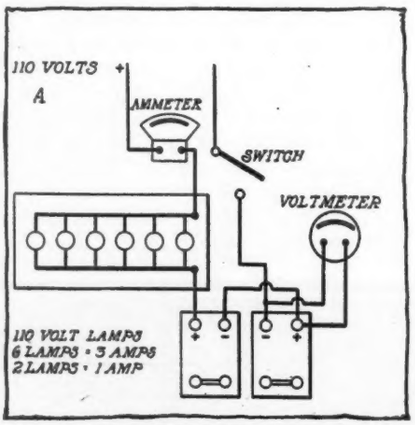


FIG. 1—CHARGING BATTERIES AT HOME

It is now necessary to build in the light of demonstrated facts. Each specification of my ideal car is a demonstrated fact.—A Farmer Who Will Place the First Order.

CHARGING BATTERIES AT HOME

Ripley, N. Y.—Editor Motor Age—Through the Readers' Clearing House will Motor Age tell me how I can make an inexpensive rheostat for use in charging a 6-60 storage battery, taking the current from my house circuit, direct current line. I wish to set it in the cellar. I have an ammeter and voltmeter.—Subscriber.

Inasmuch as you already have a voltmeter and an ammeter, the two most expensive features of a complete charging outfit, you will require nothing more than a few yards of wire, a switch, and six 16-candlepower lamps and sockets which may be arranged as shown in Fig. 1. Storage batteries may be charged wherever a direct current is obtainable. They cannot be charged from an alternating current unless some kind of a rectifier is used. In Fig. 1 it is assumed that the voltage of the main line in which the charging outfit is to be installed is 110, this being the voltage most generally employed in lighting homes. With a 110-volt current 110-volt lamps should be used and care should be taken to connect them as shown in the illustration. Each lamp when aglow allows ½ ampere to flow through the battery; two lamps would permit 1 ampere to flow and six lamps 3 amperes, which is considered an excellent charging rate. Should one be in a hurry it is within the bounds of safety to charge at the rate of 6 volts, but to do this one would have to use 32-candlepower instead of 16-candlepower lamps, these permitting twice as much current to flow through them and through the battery as the 16-candlepower lamps. In the January 5 issue of Motor Age, 1911, four charging outfits are shown illustrating how lamps may be arranged for charging from 110, 220 and 550-volt circuits, using both 110 and 220-volt lamps.

The Readers' Clearing House

EDITOR'S NOTE.—To the Readers of the Clearing House columns: Motor Age insists on having bona fide signatures to all communications published in this department. It has been discovered that the proper signature has not been given on many communications, and Motor Age will not publish such communications, and will take steps to hunt down the offenders of this rule if it is violated

ILLINOIS' ROAD FUND

Paw Paw, Ill.—Editor Motor Age—Forty thousand Illinois motorists would like to know through the Readers' Clearing House what disposition is made of the money which we pay annually for licenses.—S. T. Beale.

The state law stipulates that the receipts from registrations shall be set aside as a road fund to be used solely for the permanent improvement of the highways of the state outside of any incorporated city, town or village. Unfortunately the legislature forgot to make any provision for taking this money out of the fund and it must remain in the treasury until the next meeting of the legislature, which takes place in 1913, when legislation to this end can be enacted and the money put in roads.

MAKES A CORRECTION

Mokena, Ill.—Editor Motor Age—I stated to Motor Age the other day that my rear 28 by 3-inch tires were carrying a load of 900 pounds each. This is incorrect, as they carry a little over 700 pounds each.

I used calcium chloride as a cooling agency in a single-cylinder Cadillac that I had during the winters of 1904, '05, '06

Clearing House

EDITOR'S NOTE.—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired

and '07. During the summer of 1908 the motor began to overheat, mildly at first, but became worse rapidly. Several different mixtures were tried in an effort to remove a possible deposit but without success. Upon removing the copper water-jacket in installing a new cylinder, piston and rings I found a mottled colored deposit in the cylinder wall about ¼ inch thick. This deposit was dirty white in color in places and in others it was brown, and appeared to be of a semi-gelatinous nature and the deposit on the old cylinder, on exposure to the air for a few weeks, reduced in volume and finally fell off the cylinder from the effect of drying thoroughly. The back end of the cylinder was worn to .006 inch oversize and to this wear I believe the overheating was due and but little, if any, to the deposit. I still drive this car, but have not used any more calcium chloride. I use alcohol and water and adjust the strength of same with a freezeometer.—E. A. Terpening.

ADJUSTING WHITE PUSHRODS

St. Louis, Mo.—Editor Motor Age—Kindly inform me through the Readers' Clearing House how to adjust the pushrods in my G A 20-30 White gasoline car, they having no lock nuts as shown in an illustration in a recent issue of Motor Age of the E-M-F. The valve-lifters are just beginning to make a noise. I have investigated but cannot find out how to adjust them. The car is of the 1910 model. —Harry Cummings.

At the upper end of the pushrods of your motor that lifts the valves from the seats there is a little fiber insert D, Fig. 2. Should the space between the end of the valve stem and the pushrod, or rather between the fiber insert D and the end of the valve stem become excessive, one has but to remove the valve, drill a small hole into the insert D, screw a screweye or the like into this hole, then take hold of it with a pair of pliers and draw the fiber insert out of the end of the pushrod R. This insert then may be replaced with a new one of greater length. These inserts may be obtained from the factory or any of its distributing agencies.

It is advisable when about to replace an insert of this kind to see just about how much longer the new insert should be before the valve is removed. Then dress down the new insert with a file to the proper length before the valve spring is secured to the valve stem. After readjusting the fiber tips of the valve tappets or pushrods be careful to see that a little space amounting to about the thickness of an ordinary business card exists between the end of the valve stem and the fiber disk. Should there not be enough space at this point it will be found that when the motor warms up and the valve stems elongate due to the expansion of heat that the valves will not seat tightly; consequently there will be a loss of compression and a noticeable loss of power.

PRAISES MULFORD AS A DRIVER

Pittsburgh, Pa.—Editor Motor Age—In the summing up of racing records for 1911 published by Motor Age it seems to me a great racing driver, namely, Ralph Mulford, is not given his due, for by his work he shows up as sure, steady and reliable as a fine watch, and with his wonderful Lozier against Europe's fastest and best speed creations always is the leader or a winner. For instance, look at his Indianapolis record; second and less than 2 min-

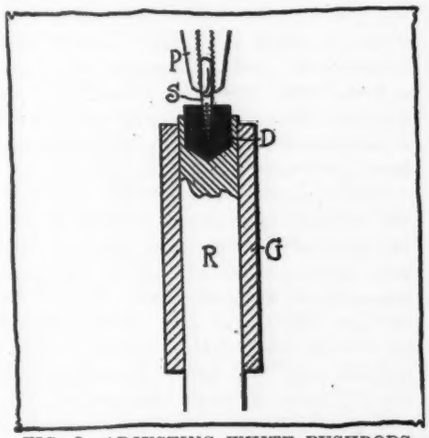


FIG. 2—ADJUSTING WHITE PUSHRODS

utes behind the specially-built Marmon that was particularly adapted to the track because of the experience of Harroun, who, like the National people, has practically lived on the track since it was built, and of whom it is said, "He knows every brick in it." Mulford had a car new to the track and weighing 3,400 pounds, practically 1,000 pounds more than the Marmon, whose minimum weight is 2,300. The Lozier used fourteen cases against the Marmon's three. The Lozier's actual running time was several minutes faster, and if it had not been for slow, bungling work in the Lozier pits by pit men who never before had seen the Michelin rim through no fault of Mulford's, he would have given Harroun in his Marmon second place, of which there is no doubt in the least.

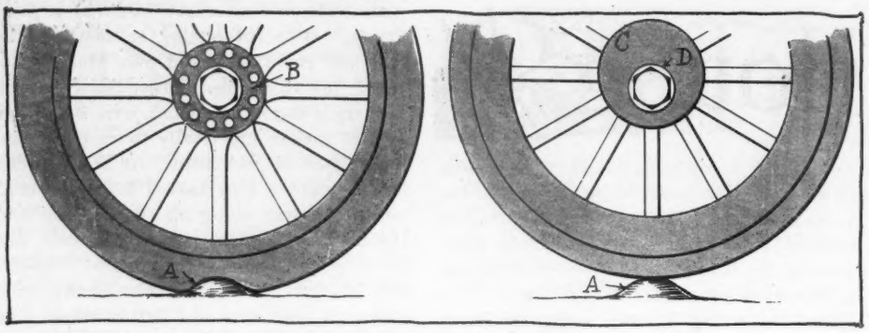
Bruce-Brown also is considered a good driver. It is interesting to compare the two. In the 1910 grand prix Mulford secured fourth against Bruce-Brown's and Hemery's Benz cars, which were 6.1 inches by 7.87 inches, practically twice the cubic-inch piston displacement. At Indianapolis Bruce-Brown's Fiat looked to be the winner, as he was doing all the pushing and leading the greater part of the race, but he secured third. In the recent Vanderbilt Mulford won over Bruce-Brown, who sprung a rear axle and lost a wheel. In the grand prize Mulford was right there with the big special cars on the twenty-second lap, and would have secured a place had he not unfortunately been put out by the breaking of a part no larger than your hand on his car, which had carried him through the Vanderbilt a winner a few days previous.

I think Motor Age should make some mention of Mulford's world's record as a driver, namely, 500 miles, the longest and fastest race ever driven by one man. Before the race there was considerable discussion as to the possibility of a driver having the endurance to withstand the strain for the distance, so on this account I consider Mulford should receive the publicity actually due him. He also holds a record of 20 hours straight at the wheel in one of his many record-breaking 24-hour races at Brighton Beach.

Harroun is sometimes advertised as the world's champion driver because of his winning in the 500-mile race, but I have my doubts, as it took an old Lozier team mate of Mulford's who practically won the 500-mile event for Harroun, by placing him first ahead of Bruce-Brown in his Fiat, Cyrus Patschke being the man who, with Mulford, established 24-hour stock chassis records at Brighton Beach.

I notice Motor Age gives the National first because of its Santa Monica work, a fraction of a mile faster than Tetzlaff, a driver inferior to Mulford, who with a 1910 Lozier that saw a great deal of service before it was stripped for racing, and which is known to be 10 to 15 miles slower than the 1911 and 1912 Lozier, established the American record in 1910. Then, too, there is a difference in the air on the Pacific coast, admitted by all the drivers, who can get about 10 miles an hour better than in the east. A car that can better the National record in the Vanderbilt and grand prize, as did Mulford in his Lozier and Hearne in a Benz at Savannah, can average 80 miles an hour.

I feel honored in having been a team mate of Mulford's in the 500-mile Indianapolis race, and there never has been an equal in a racing driver who has the record, reliability and personality of Mulford every time. Should Motor Age give him all the praise due him as the best driver in the best car, it will greatly please his many friends and the writer, who has followed him up in his great work.—Harold Van Gorder.



FIGS. 3 AND 4—FLEXIBLE NON-RUBBER TIRES

Motor Age would ask Mr. Van Gorder to again read the review referred to which will show him that the article in question dealt only with road racing, not the sport in general. No critic disputes the ability of Ralph Mulford, who was picked as champion road driver of 1910 by Motor Age, but the road records of 1911 prove plainly that the crown now belongs to Herrick. If one were to consider all-around racing ability, Mulford undoubtedly would be entitled to the greatest consideration, but even his showing at Philadelphia and Savannah does not entitle him to the championship in the opinion of Motor Age.

Mr. Van Gorder is in error in supposing the National was declared the car champion of 1911 because of the showing at Santa Monica. The award was made because the National won nine of the twelve races in which it started, backed up by three seconds and two thirds, nineteen of the twenty-two Nationals which started in those twelve races finishing.

FLEXIBLE NON-RUBBER TIRES

Robert Lee, Texas—Editor Motor Age—I noticed an article in the Readers' Clearing House of Motor Age, December 21, in regard to a floating hub wheel for motor cars, etc., signed by J. Munden. I have been studying the different phases of the resilient tire or wheel problem for more than 7 years, and have decided there cannot be a successful resilient wheel built having an unflexible surface coming in contact with the road. What I mean by a successful wheel of this type is a wheel substantial, resilient, easy to adjust, cheap in upkeep, easy to repair, reasonably cheap in first cost and not noisy.

To illustrate my view of the wheel described by Mr. Munden in comparison with the pneumatic tire, I am inclosing two sketches. Fig. 3 at A shows what really occurs when a small stone is struck by the pneumatic tire. The small stone imbeds itself in the face of the tire and produces no shock or vibration whatever. Fig. 4 represents a wheel fitted as suggested by Mr. Munden. At A is a small stone encountered by the wheel and at D is shown an exaggerated action of the hub in this type of wheel. It will be seen that the tire, being unflexible is forced to rise high enough to pass entirely over any obstructions met with. Now it is easy to see that this hub action is bound to cause great vibration besides taking more power to propel a vehicle fitted with such a tire to rise high enough to overcome or pass over the obstruction.

If the proposition is to try to overcome or deaden the shock after it has been transmitted to the wheel, why not put more resiliency in some manner between the axle and the frame, as most of the machinery is hung to the frame, and would receive the same protection as if the resilient action were placed in the wheel. It appears strange that most inventors are trying to put springs in the wheels, hub, spokes or felloes, and if they would only test out the proposition it would be seen there would be very little gained in having the resiliency in the wheel to try to overcome the shocks when it can so much easier and without complication be placed between the frame and the axle. This has reference to the tire and wheel inventors who try to build a resilient wheel using an unflexible surface that contacts with the roadbed.

I have a tire which I think is correct. The surface that comes in contact with the roadbed is hinged in short sections thus allowing it to conform to the small unevennesses such as stones, etc., of the roadbed. The outer part of the tire can be covered with leather, rawhide, or any material that will keep out dust, water, etc. I made a wheel along these lines and tested it out on a bicycle, and find it so far a success in every way. I am going to have a set made to fit a Ford soon and will write Motor Age the result of the test.—Charles E. Goss.

CONTROL OF THE SPARK

Little Rock, Ark.—Editor Motor Age—Through the Readers' Clearing House will Motor Age answer the following questions:

1—Does Motor Age know of any dressing that it would recommend for the preservation of mohair tops? I have heard that putting grease on them in some way would prevent leaking. If so, will Motor Age explain how it should be put on?

2—When the spark is advanced or retarded how is it that the speed of the engine is changed? What takes place to make this change?—Haynes.

1—One of the leading motor car top and body manufacturing and repair concerns in the city of Chicago claims that it has tried a number of the so-called waterproofing materials for tops such as yours and found none of them satisfactory. If, however, there are any readers who have found a preparation that is successful, information to that effect will be appreciated by Motor Age and its readers.

2—The spark control lever of a motor car is provided to advance and retard the occurrence of the ignition spark in the cylinders of the motor so that the ignition of the gas will take place at the proper time or as near the proper time as the judgment of the operator will permit. Inasmuch as it takes a certain length of time for combustion of the gas in the cylinder to take place, when a motor is running at a high rate of speed it is desirable to make the ignition spark occur in the cylinder while the piston is still ascending on the compression stroke. So that by the time the piston has started to descend combustion will have had more time for completion and the maximum pressure will have been created.

If when the motor is running at a high rate of speed the spark lever is retarded, the piston will have descended far down on its explosion stroke before combustion is complete; in fact, the ignition itself will not have occurred until perhaps the piston had descended a considerable distance. The farther down the piston is in the cylinder the less the compression of the gas and the less the compression of gas the slower its combustion; for these reasons when the spark is retarded the piston may be half way down in the cylinder on the explosion stroke before combustion is complete and its maximum pressure generated, and owing to the increased amount of space in which it has to expand its pressure is not nearly so great as if it had been created while the piston was at the top of the cylinder and the combustion space smallest. It is obvious, therefore, that the slower the ignition the slower the combustion and the less amount of power produced, hence the decrease in speed of the car.

In Fig. 5, a diagram is shown which is intended to indicate the range of spark advance and retard, representing different positions of a crankshaft, and the relation of the piston in the cylinder at these different positions. Referring to this diagram, if a motor is running at an extremely high rate of speed, the spark might be advanced so as to occur in the cylinder when the throw of the crankshaft is ascending and at the point A, thus combustion might be complete or so near complete by the time the throw reached the point D, that a very strong pressure would be exerted upon the piston, which is as

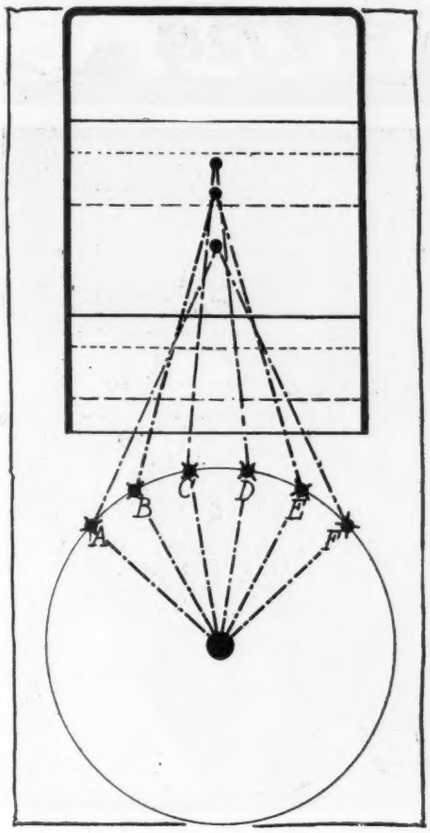


FIG. 5—RANGE OF SPARK CONTROL

it should be. If the motor were being subjected to an extremely hard pull as in ascending a hill on high gear, so that its speed is considerably reduced, and ignition were to take place at A, combustion might be complete at B or C, and the pressure or power-impulse on the piston-head would tend to turn the crankshaft in a reverse direction.

If the car were traveling at a very low speed or if there were not sufficient momentum in the flywheel or the car itself, the motor would be stalled, or killed as the saying goes. Of course if the car or motor were traveling at a sufficiently high rate of speed to carry the shaft and piston over this dead center a large percentage of the power would be applied in the right direction, but considerable would be lost, there would be what is known as an ignition knock, and the strain on the bearings would be quite severe. On the other hand, if the motor has been slowed down considerably under a hard pull and the ignition is retarded so as to occur at about C or D, combustion might be complete at about E or F, or perhaps even a little farther down where the leverage on the crankshaft is greatest, and thus the greatest amount of the downward pressure on the piston is utilized. It must be remembered that the greatest power is dependent upon the momentum or torque of the flywheel. A motor always should be run with the spark advanced as far as possible without causing the motor to knock or lose power, and a motor will overheat if caused to run for any great length of time with a

As few motorists really understand just how the power efficiency of a motor is affected by the spark-timing which is generally under the control of the operator, the following may be of interest. When a combustible mixture has been compressed in a cylinder by the rising piston and the spark occurs, a very small portion of the mixture in the immediate vicinity of the spark is ignited; and if the mixture is of the proper proportions and suitably compressed, the flame propagation throughout the entire combustion-chamber will be rapid. This is as it should be. When combustion takes place intensely heated gases are formed which in their effort to occupy a larger volume of space, exert great pressure on the walls of the combustion chamber and upon the piston head. As a gas or gaseous mixture is compressed it becomes heated, and the greater the pressure the greater the heat. If a mixture is of proper proportions, the greater the pressure the more readily will it ignite and the greater the speed of flame-propagation or combustion. On the other hand, as the pressure of a combustible mixture is reduced, it loses its heat, and its speed of ignition and combustion is also reduced. Thus it must be understood that to get the utmost efficiency out of a combustible charge, it must be ignited at or near the point of maximum compression.

Several interesting conditions may be shown with the diagrams of Fig. 6, which like Fig. 5, represents different positions of the crankshaft, and of the pistons in the cylinders. Let it be assumed that a car is being driven at a speed of about 30 miles per hour, and that the motor is necessarily turning over at a speed of about 800 revolutions per minute, the spark lever advanced so the spark occurs when the pistons are ascending as at G. Ignition, we will assume, is complete at H, and combustion at I, at which point the maximum pressure of the expanding gases is being exerted. Under these conditions, the motor runs smoothly and cool. Now by retarding the spark and advancing the throttle levers, it is found that the speed of 30 miles an hour still can be maintained. The motor is generating the same amount of power, but with the spark retarded and the throttle advanced; but after a 30 minutes running the radiator begins to steam and we see that the motor is overheated. What is the cause? It is this. The spark is retarded so that now it occurs when the piston is as at I, compression is already reduced so that ignition is slower and is not complete until the piston is at J, and combustion is still incomplete at K. The explosive mixture is now richer in fuel so that more heat is given off than under the first mentioned condition, therefore the expansive force is greater than before, so that the speed of the motor is the same, but note the wall surface of the cylinder at K which now is exposed to this more intense heat. The water in the jackets not only has to take care of the heat absorbed by the walls of the combustion chamber, but also of an excessive amount absorbed by the cylinder walls.

SORTING OUT WIRES

Seattle, Wash.—Editor Motor Age—Both amateurs and mechanics encounter a most perplexing problem when they have the two, four or six high-tension wires all disconnected from plugs and coil or magneto, when they are all twisted and concealed in insulation or tubing. Of course there are two, four or six loose ends at each end, but the question is, which is which at the other end?

Assuming that it makes no difference which wire leads from coil unit No. 1 or distributor terminal No. 1, just so it is attached to spark-plug in cylinder No. 1, we will take one strand and attach it to a coil or distributor and a dry cell, and from the other terminal of the dry cell lead a common wire about six feet long to an ordinary pocket ammeter. Then touch the other terminal of the ammeter to each of the four strands at the spark-plug end. When the instrument is touched to the right strand it will operate and thus reveal the secret of the twisted and concealed strands. The strands can then be marked at each end and thereafter easily connected up to the proper terminals without confusion. Each of the remaining strands can be treated in a similar manner.

This method of testing can, of course, be applied to the primary wiring and to the lighting system.

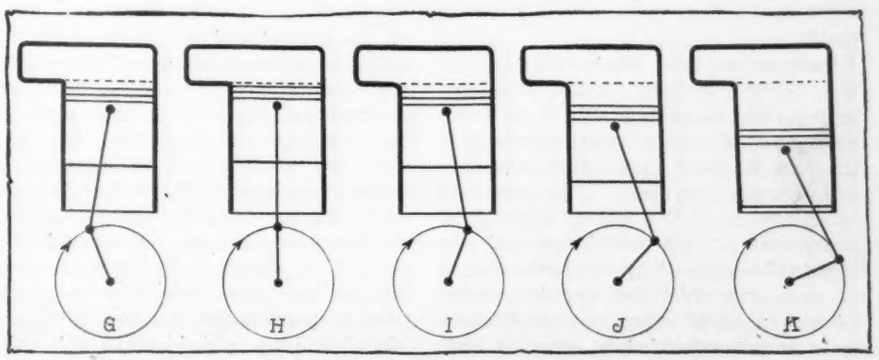


FIG. 6—DIAGRAMS SHOWING WHEN SPARKS SHOULD AND SHOULD NOT OCCUR

From the

BOYD State Registrar—Thomas E. Boyd, Pittsburgh, formerly clerk in the state banking department, Harrisburg, has been appointed registrar of the motor car division of the Pennsylvania state highway department.

Michigan Makes Money—According to the annual report of Secretary of State Martindale of Michigan, motor car license fees yield the state an average of $100,000 a year, while the incorporation fees of new motor car companies add a large amount to the annual receipts of the department.

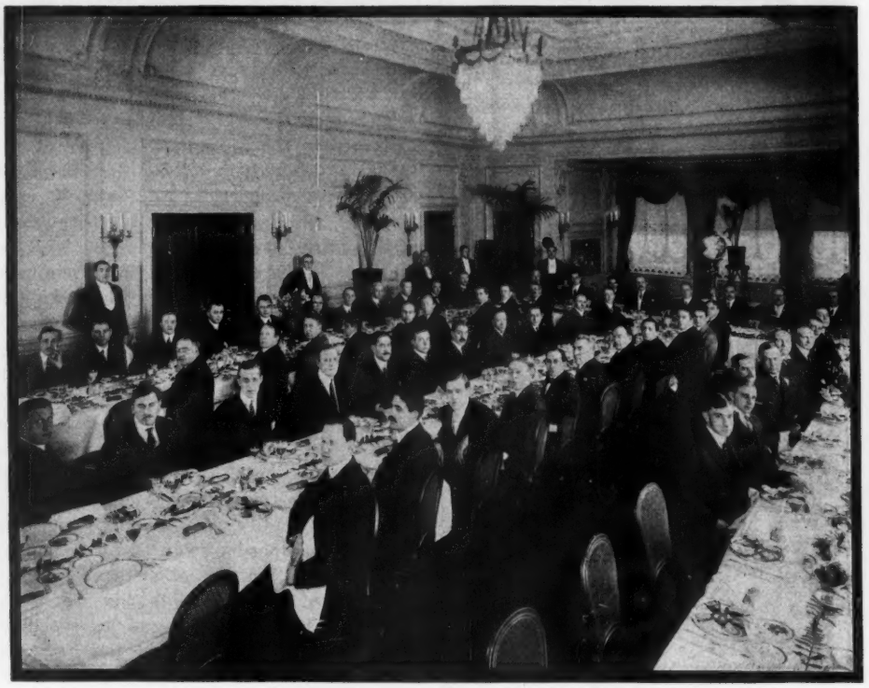
Speedway Bars Oldfield—Carl Fisher has issued an ultimatum to the effect that Barney Oldfield will not be permitted to race on the Indianapolis speedway even if he is reinstated by the A. A. A. This was brought about by the story that Oldfield and Burman would engage in a match race on the big oval if the former could secure reinstatement.

Another Bay State Club—Secretary James Fortesque, of the Massachusetts State A. A. has added Norton, Mass., to the places in the Bay state where he has organized motor clubs. There are forty motor car owners in the picturesque little place. The following officers were elected: Dr. A. M. Round, president; George S. Wood, vice-president; R. W. Hewins, secretary-treasurer.

Tag Question Up—Motorists of Maryland are interested in the test case of a Washington motorist as to whether a motor car owned in the District of Columbia must have a Maryland license. The case will be argued by Attorney General Poe of Maryland before the United States supreme court. Should the court decide in favor of the Washingtonian, Secretary Luzius, of the Automobile Club of Maryland, declares that it will affect the motor laws all over the country.

Goodrich Touring Bureau—The B. F. Goodrich Co., which is erecting signboards throughout the country, has established a touring bureau which has been placed in charge of Raymond Beck, formerly of the touring department of the Automobile Club of America. The work of this department so far includes the marking of more than 9,400 miles of routes and the erection of more than 5,800 markers. Plans have been made to erect 4,500 more signs in 1912, covering 13,000 miles of routes.

Carrying on Good Work—The Automobile Legal Association of Boston is preparing to place guide boards at all intersecting and diverging streets and roads in the New England states where directing signs are not now placed. This work will be in charge of the touring information department of the association and the signs will be placed by the operatives of its route car which has already covered more than 14,000 miles of New England roads and is scheduled to cover at least 6,000 miles more during 1912. The officials of the Automobile Legal Association estimate that at least 4,000 signs will be necessary in order to complete the work and that it will involve an expenditure of not less than $2,000.



MAXWELL TEAM PRESENTED WITH GLIDDEN TROPHY AT NEW YORK BANQUET

Johnny Aitken Marries—The marriage of Johnny Aitken, of the National racing team, and who is now employed by the National Motor Vehicle Co., to Miss Bessie Ioor, took place in Indianapolis a few days ago. Howard Wilcox, of the National racing team, acted as best man.

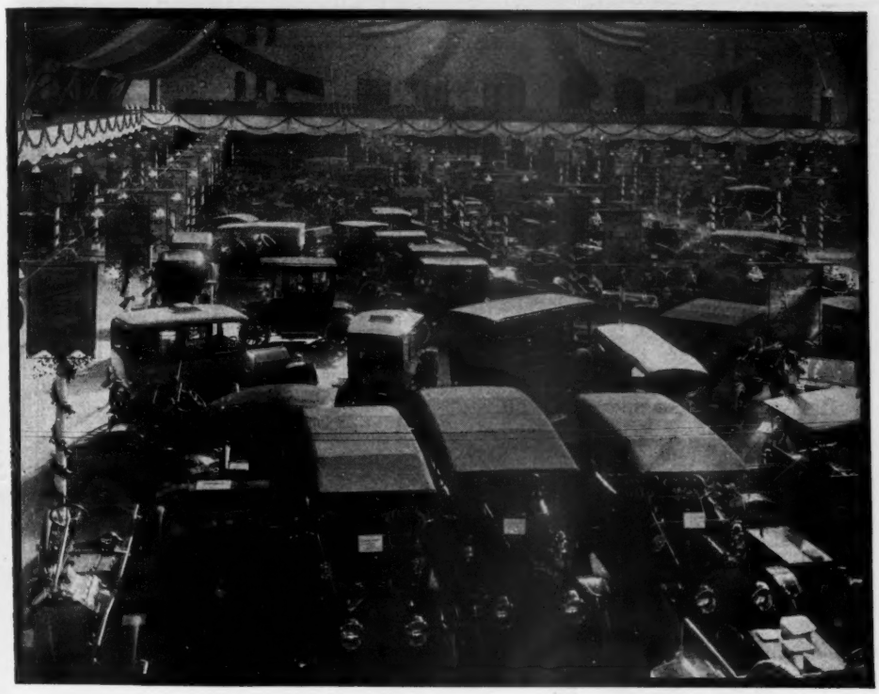
Minnesota's Estimate—State Secretary Julius Schmahl says that between 15 and 20 per cent of the motor cars owned in Minnesota belong to farmers. Although 19,200 machines were licensed in 1911 the secretary believes there are 20,000 in the state. He figures the investment at $20,000,000. In 1910 there were 12,000 registrations and 30,000 are expected in 1912.

Disbrow on Case Team—Louis A. Disbrow, whose work with the Pope Hummer on track, road and speedway during the last year or more has given him a high rank among racing drivers, is now busy reorganizing the racing department of the J. I. Case Co., of Racine, Wis. Disbrow last week signed the contract to become manager of the Badger corporation's racing interests, thus succeeding the late Lewis Putnam Strang. Disbrow has not yet chosen members of his team, but has been given carte blanche by the Case company to get the best there are. The Case team probably will not make any strong bid for high honors until the Memorial Day meeting at Indianapolis, where Disbrow and another partner, to be selected, will drive Case specials of 90 horsepower, now under construction at Racine under Disbrow's direction.

Washington Club Election—Harrington Mills was elected president of the Automobile Club of Washington at the annual meeting. Other officers elected were: Vice-president, T. S. Johnston; secretary-treasurer, John K. Heyl; captain, Rudolph Jose; lieutenant, Gardner Orme; board of governors, W. C. Long, W. S. Duvall, Claude Miller, O. J. DeMoll, W. C. Thacher, Leroy Mark. The question of changing the form of the organization was brought and after an animated discussion was laid over for 3 weeks, at which time a special meeting will be held to decide the matter.

Georgia Club Organized—After working for months on preliminary details, the Automobile Club of Georgia is at last a reality and the following officers named: George W. Hanson, president; Ed. M. Durant, vice-president; J. D. Rhodes, treasurer; Howard Geldert, secretary; directors, Walter P. Andrews, Inman Gray, W. G. Humphries, Chas. I. Ryan, R. R. Arnold, John J. Woodside, Jr., Chas. H. Black and J. T. Tucker. For convenience in transacting business all officers were Atlantans, but vice-presidents will be named in various parts of the state, who will be ex-officio members of the board of governors. It was decided to have two forms of membership, Atlanta and state. This was made necessary

Four Winds



FIRST SHOW ON 1912 WINTER CIRCUIT—VIEW OF THE BUFFALO EXHIBITION

because it is planned to open a club house in Atlanta. The initiation fee for Atlantans will be $10 and the dues $18 a year. For state members the initiation fee is $5 and the dues $5.

Rules on Light Law—Attorney General Lyndon A. Smith of Minnesota has given an opinion on the new motor law requiring all vehicles, except motor cars, to carry white lights front and rear, that white means white in the law and that red means red. The opinion holds against vehicle owners who have been carrying red rear lights. The car owners are in favor of the law requiring other vehicles to be protected by lights and expect to see that the law is enforced rigorously as soon as the supply of lamps is sufficient to equip all rigs.

Pennsylvania's Showing—Although the Pennesylvania state highway department will not begin the issuance of the mahogany-colored license number tags for 1912 for several days, applications for licenses have been pouring into the state capitol that indicates a registration that will rival or, perhaps, exceed the record-breaking figures of 1911. Governor Tener was the first to apply for a license for 1912 and he will get No. 1. Next to him, with No. 2, is State Highway Commissioner E. M. Bigelow, and No. 3 goes to Chief Engineer Foster of the state highway department. So far this year the state highway department has registered and licensed 44,270 cars, and in addition issued 4,034 licenses to dealers or manufacturers, so that 50,000 is by no means far off the total number of cars in the state, dealers being allowed to use numbers on more than one car. In the special class, or licenses issued to persons under 18 years of age who have demonstrated their ability to operate a car, the number is 874. In 1910 the number of machine licenses was 34,346, against 34,351 in 1909 and 25,200 in 1908. The revenue derived from licenses in the official year of 1910 was $320,365.

Small Wisconsin Registration—Although all Wisconsin motor car licenses expired on December 31, 1911, only 6,500 owners have applied for new registration and the new double license plates. The total registration on December 31 was in excess of 25,000. It is believed that the difference is to be found in the fact that owners who are storing their cars over winter will delay making application until they are ready to go out. The fee is $5 and all registrations are annual.

Nebraska Registration Figures—The registration figures at the office of the secretary of state of Nebraska show that the year 1911 has far surpassed any previous year in number of car sales. On December 1, 1911, there were 23,216 motor vehicle registrations. The last 3 years have been the biggest in point of number of sales in Nebraska, and are as follows: December 1, 1908 to December 1, 1909, 4,346; December 1, 1909, to December 1, 1910, 6,119; December 1, 1910, to December 1, 1911, 8,608. So that the year 1911 leads the next highest year, 1910, by about 40 per cent. Practically all of the cars sold in Nebraska are either wholesaled or retailed by Omaha firms, including the Omaha branch houses, except for those sold by Council Bluffs dealers, that city being just across the river from Omaha.

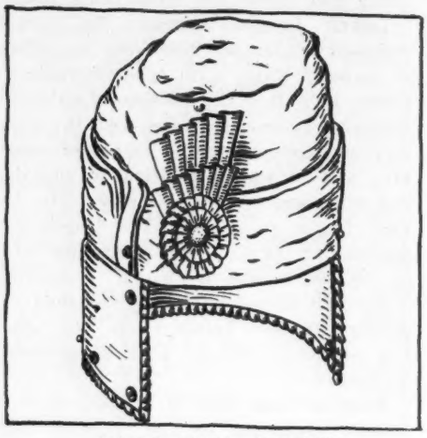
Lowell League Formed—The Lowell Automobile League has been organized at Lowell, Mass., with a membership of nearly 100. It is the outcome of agitation following various meetings with the highway commission relative to better roads, etc., and so the proposition to organize met with approval in this city. The annual fee is to be $1. The league has adopted by-laws and at a meeting later on the officers will be chosen. A clearing house will be established giving data regarding garages, hotels, roads, etc. Special attention will be paid to proposed legislation.

Another Coast Run—T. J. Beaudet and Chester Lawrence, of Los Angeles, Cal., left Los Angeles January 1 on the Pacific Highway Association's first-to-Mexico run, a motor journey which will be similar to the first-to-Hazelton run of the Flanders. A gold medal will be awarded to the owner or driver of the first car touring continuously between San Diego and Mexico City. As the Cadillac started from Los Angeles the rules demand that it follow the P. H. A. highway to San Diego, and thence down the coast, at no time more than 199 miles east of the Pacific ocean.

After Chicago-Milwaukee Road—Milwaukee and Chicago business men will confer in Milwaukee late this week on the project of improving a short and main traveled road between the two cities. The project was started by the Citizens' Business League of Milwaukee, a leading commercial promotion society and actual work was begun last fall. The road will be graded, dressed and provision made for maintenance. The King drag will be used liberally. It is proposed to issue a radiator emblem typifying support of the Chicago-Milwaukee road project, to be sold to motor car owners at $5 or $10 each to assist in raising funds.

Maine's New Law in Force—Maine's new motor law went into effect January 1. Under the new law the cars are divided into three classes and proportionate fees are charged according to horsepower as follows: Under 20 horsepower, $5; from 20 to 35 horsepower, $10; all above 35 horsepower, $15. Motor trucks or cars used for commercial purposes are rated at $10 and this includes traction engines or log haulers. Motor cycles are placed at $3. Dealers in motor cycles pay $6 and dealers and makers of motor cars or trucks pay $25. It costs $2 for a fee to operate a vehicle. Maine does better than its sister states in New England, for instead of limiting non-residents to 10 days it allows them 30 days. The money will be used for road maintenance.

Current Motor Car Patents



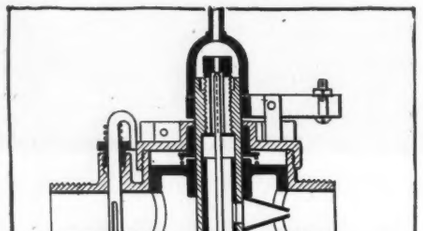
MAJOR MOTOR TURBAN

GASOLINE Tank Valve Control—No. 1,012,933, dated Dec. 26, to Charles Lee Thomas, Canisteo, N. Y.—This patent pertains to a means for operating a gasoline tank valve of a motor car having in combination a hollow casing provided with a key hole, a rotatable operating rod having at one end a clutch head capable of detachable engagement with the handle of the valve and at its opposite end portion a bolt seat and a wrench seat, and a movable bolt working in the casing and having releasable engagement with the bolt seat, the bolt having a cam-beveled end capable of engagement with the cam outer face of the bolt to release it and a recess capable of engagement with the wrench seat of the rod to turn it.

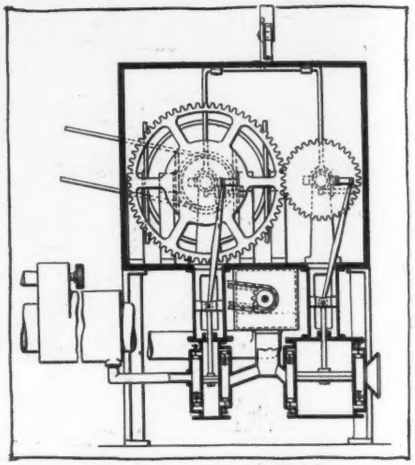
Winters Carbureter—No. 1,012,781, dated Dec. 26, to George W. Winters, DeQueen, Ark.—This patent shows a carbureter comprising a body having an air inlet passageway and a mixture outlet passageway, a cylinder journaled within the body and having an air inlet and a mixture outlet, a tube fixed with relation to the body, a sleeve fixed with relation to the cylinder and snugly receiving the tube, the tube and sleeve having at points between the upper and lower ends of the cylinder openings adapted to register, a nozzle surrounding the opening upon the sleeve and having a flattened discharge end passing through the mixture outlet in the cylinder and having its extremity in an arc coincident with the arc curvature of the outer periphery of the cylinder and means for introducing air and oil into the tube.

Major Motor Turban — No. 1,012,675, dated Dec. 26; to Lura S. Major, Chicago, Ill.—This patent pertains to an article of hearwear comprising a turban, a single flap attached along a major portion of the lower edge thereof, and a socket and coacting stud attached to the lower edge of the flap when the flap is turned down so as to form a fold in the lower edge of it when they are brought into engagement with one another.

Kessler Gas Engine—No. 1,012,652, dated Dec. 26; to Martin C. Kessler, Denver, Colo.—This patent takes in a three-port type of internal combustion motor having in combination a cylinder and a piston, the cylinder having an air inlet port, a valve for this port, actuating means for the valve, and means to adjust this actuating means to cause the valve to open at every in-stroke of the engine, or at every alternate in-stroke of the engine, and to vary the time of opening on the alternate in-stroke.



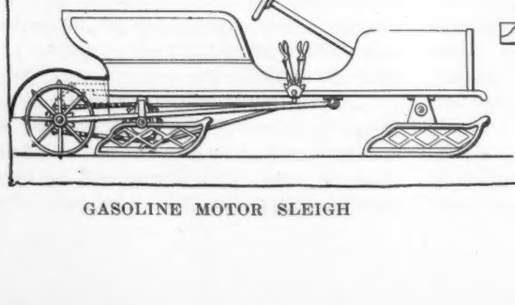
WINTER'S CARBURETER



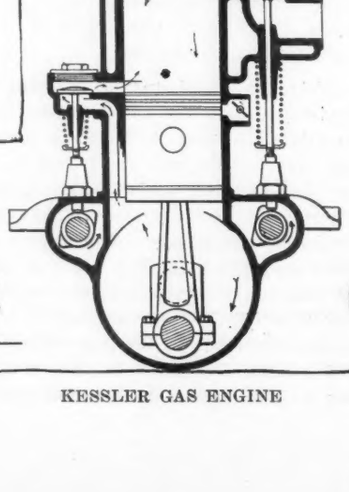
MELTON CARBURETER

Gosline Motor Car Sleigh—No. 1,012,627, dated Dec. 26; to Edward W. Gosline, Gemmell, Minn.—This patent pertains to a motor car sleigh comprising a combination with a body, of front and rear runners disposed beneath the body to support it, bars pivoted at one end upon the sleigh body and extending rearwardly therefrom at opposite sides a transverse revoluble shaft connecting the ends of the bars, driving wheels mounted on the shaft, adjacent to each end thereof, a power shaft mounted on the rear runners, sprockets on the shafts, sprockets carried by the driving wheels, endless chains connecting these sprockets with the sprockets on the shafts, means arranged upon the body to support the transverse shaft, means for elevating the driving wheels, and guides for the pivoted bars secured to the rear runners.

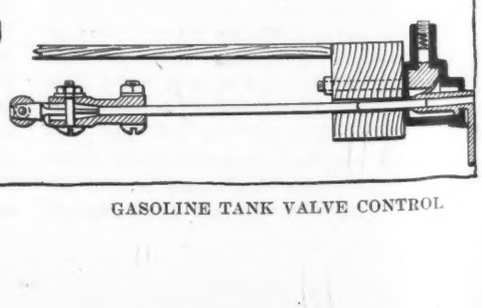
Melton Carbureter—No. 1,012,687, dated Dec. 26; to Lloyd L. Melton, Chicago, Ill.—This patent relates to a carbureter comprising a vapor pump and an air pump of greater capacity than the vapor pump, means for simultaneously increasing the stroke of one pump and decreasing the stroke of the other and means for automatically varing the speed of the pump as their strokes are varied to maintain a constant aggregate output.



GASOLINE MOTOR SLEIGH



KESSLER GAS ENGINE



GASOLINE TANK VALVE CONTROL

The Motor Car Repair Shop

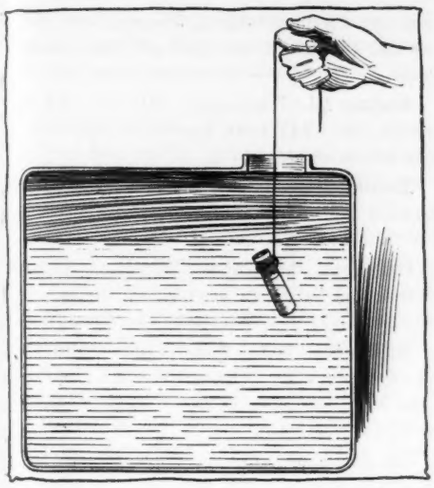


FIG. 1. GETTING SOME GASOLINE

Cold Weather Hints

WITH the heavy grade of fuel that is now being supplied the motorist, to say nothing of the low temperature that prevails throughout the greater part of the motoring world at this season, it might almost seem absurd to suggest that there are motorists who are not provided with a gasoline priming can; that is, a can containing gasoline used in priming the motor to facilitate starting. However, there are times when those who are in the habit of carrying priming cans, either leave them at home or at the garage, or at least find them empty when required for use. In a contingency of this kind, one is liable to be at a loss for suitable means of priming the motor; and considerable muscular effort often has been wasted in a vain endeavor to start a cold motor without priming. It might be helpful, therefore, to show one or two methods of transferring a little gasoline from the fuel supply tank to the cylinders, with means that are to be found on almost all cars at all times.

In Fig. 1, is shown how in the absence of a regular priming can or a means of filling an empty one, a valve cap was removed from one of the wheels of the vehicle, a string tied to it, and the cap then lowered into the gasoline supply tank as illustrated. A single capful of gasoline is just about enough to prime four cylinders of a motor. Of course if a wire were to be attached to the cap instead of a cord, the cap would not hang at an angle and a little more fuel could be dipped up with it. By this means, either an empty priming can might be supplied, or the can ignored and the fuel poured directly into the priming cups or through the spark-plug holes.

Another effective means of accomplishing the same results is shown in Fig. 2; a piece of waste being used to absorb and transfer the fuel from the tank to the cylinders. Of course if there is no waste or valve caps on the car, a handkerchief or a piece of one's wearing apparel might be advantageously used. The absorbent article may be secured to a piece of string, or wire, or wrapped around the end of a stick of wood, then lowered into the gasoline tank. When saturated, it can be removed, held over the pet cock, and squeezed until the required amount of fuel has been introduced into each cylinder.

When a cloth or bunch of waste is used for the above mentioned purpose, starting may be even further facilitated if the fuel-dampened cloth is lightly held over the air inlet of the carbureter, while the motor is being cranked. In doing this, however, one should be careful that shreds of waste or cloth are not sucked into the carbureter. When waste is used it should be either wrapped into a neat bundle or in a handkerchief.

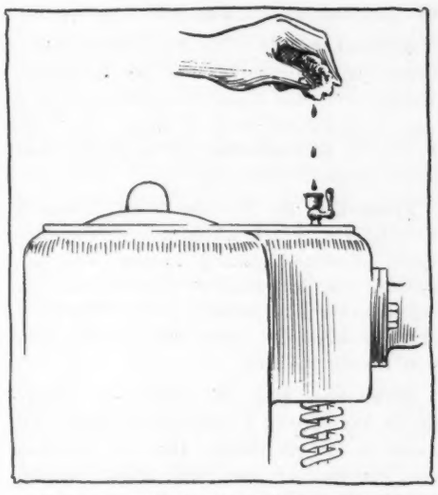


FIG. 2. USING SATURATED WASTE

While on the subject of starting motors in cold weather it might be well to cite other practices that are used to advantage. There is one motorist, for instance, whose garage is not a warm one, but it is provided with electric lights; and he has a little electric heater attached to one of the sockets by a cord which enables him to place the heater under the hood of his motor car on the intake side. This he does just before breakfast each cold morning, that he uses the car, and turns on the current. By the time he has finished his breakfast and is ready to leave, not only is the carbureter and the inlet pipe of the motor warmed up, but the cylinders and the radiator all are so warm that a single turn of the crank suffices to start the motor which otherwise would require a generous amount of priming and cranking. A charcoal foot warmer such as is employed by cab drivers may be equally effectively used when there is no convenient electric wiring.

Another motorist, who prefers draining his cooling system every evening to using a non-freezing agent, saves himself the annoyance of unnecessary cranking by refilling his cooling system with hot water before starting the motor in the morning. This motorist prefers plain water to a non-freezing agent because it takes only a few minutes to draw off the water and a few minutes more to fill up in the morning.

Motor Age is in favor of the use of a non-freezing agent composed of a mixture of alcohol and water, as being the most economical in the majority of cases and requiring less regular attention. But for the benefit of those whose cooling systems may, and are so constructed as to be readily and completely drained, the warm water practice is to be recommended. When a motor is very cold and the water is introduced into the radiator in the usual way, it often is found that the hot water does not greatly facilitate starting, because by the time it has warmed up the cold walls of the radiator there is little heat left for the cylinder walls and jackets. To overcome trouble of this nature, a specially constructed funnel might be provided by means of which the hot water could be directed through the cylinder jackets before passing through the radiator. This might be done as illustrated in Fig. 3. The funnel, which is of ordinary construction, simply has a curved extension soldered onto the end of it which directs the water into the return water manifold connection instead of letting it flow into the radiator as usual.

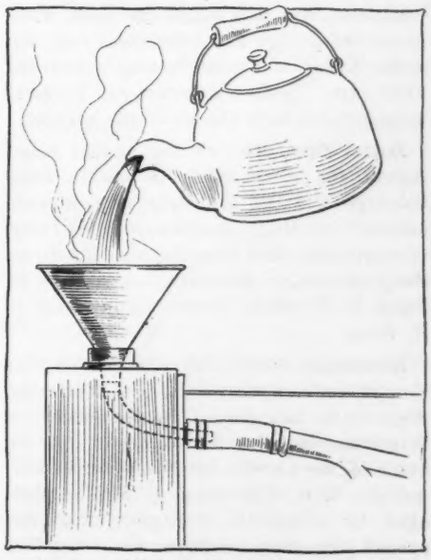


FIG. 3. HOT WATER HELPS STARTING

Brief Business Announcements

NEW LEXINGTON, O.—C. C. Dillow & Son have taken the 1912 agency for the Buick in Perry county.

Oak Park, Ill.—Charles F. Dreschler has secured the contract for the present season to sell Franklins in this territory.

South Lancaster, Mass.—The Velie Boston branch has closed with Nelson A. Seymour for South Lancaster and the adjacent territory.

Chicago.—The Moran Auto Sales Co. has closed a contract with the Velie Chicago branch for Grand Rapids, Mich., and adjoining counties.

Minneapolis, Minn.—The John P. Snyder Co. has taken state rights in Minnesota for the Lexington. The Snyder company is about to open a new garage. It handles the Fiat.

Omaha, Neb.—The Powell Supply Co. has closed a contract with the manufacturers of the Hess-Bright ball bearings, for the handling of that product in this territory.

Detroit, Mich.—L. W. Taylor has been placed in charge of sales for the state of Michigan by the Krit Motor Car Co., and will have his offices in the local sales rooms at 465-467 Woodward avenue.

St. Paul, Minn.—The Foster-Lawrence Co. has the St. Paul agency for the Detroit electric and has accepted plans for a new garage, Grand avenue, between Grotto and Avon streets, the best residence section.

Madison, Wis. — L. F. Schoelkopf has rented the former Burton-Littlewood garage at 114 East Wilson street and will use it in connection with his garage at 116 South Pinckney street, as a storage warehouse.

Crandon, Wis.—Frederick J. Rogers, of Nashville, Wis., has leased the Bank warehouse for garage and salesrooms and will make Crandon a distributing point for Ford cars. Leslie J. Carter will be local manager and have charge of the garage.

Dallas City, Ill.—At the annual meeting of the stockholders of the L. Burg Carriage Co. the following officers were elected: L. Burg, president; F. W. Burg, vice-president and treasurer; Homer Lynn Burg, secretary; directors, L. Burg, O. E. Burg, F. W. Burg, Homer Lynn Burg, C. H. Burg.

Milwaukee, Wis.—The Ideal Motor Car Co. of Indianapolis, Ind., manufacturing Stutz cars, has gained representation in Wisconsin by the establishment of the Stutz Motor Car Co. of Wisconsin in Milwaukee, Wis. The company will be managed by Edwin E. Arlington, who has opened temporary headquarters in the Majestic building. Early in spring work will begin on the construction of a large garage and salesroom building on the east side of Milwaukee.

Wilmington, Del.—The Wilmington Automobile Co. has taken the agency for the Packard car in the state of Delaware.

Roanoke, Va.—The Raleigh Motor Vehicle Co., Inc., of this city has renewed its arrangements to sell Franklin cars in this territory for another year.

Chicago—The American Electric Co. of Chicago has established retail salesrooms at 1254 Michigan avenue, where the Samson electric horn will be handled.

Chicago—W. H. Howe, formerly superintendent and assistant manager of the Chicago Rambler branch, has been made assistant manager of the Quality Car Co., Premier representative here.

Akron, O.—A permit has been granted to the Diamond Rubber Co. for a new tire store room to be 61 by 71 feet and two stories high. It will be constructed of tile and cement and will cost about $5,000.

Milwaukee, Wis.—The Pauly-Bruce-Goldacker Co., state agent for the Stoddard-Dayton line, has been incorporated with a capital of $25,000 by L. C. Pauly, Jr., J. G. Bruce, E. F. Goldacker, E. L. Bahler and C. P. Lauson.

Bronxville, N. Y.—The Ward Leonard Electric Co., which manufactures an automatic dynamo lighting system, has appointed the Johnson-Fay Electric Co., its representative in Buffalo, N. Y. The Conduit Electric Co., Syracuse, N. Y., also will handle the line.

Milwaukee, Wis.—The estate of Albert Smith has formed a corporation under the name of Albert Smith, Inc., to continue the business of the late Albert Smith, 169-175 West Water street, for many years state agent for the Palmer-Singer. H. F. Boggis will be manager. The company does a large electrical business.

Shelbyville, Ind.—The Clark Motor Car Co. announces the following distributing agency appointments: William R. Cunningham Auto Co., Des Moines, Ia.; Williams-Hasley Motor Car Co., Pittsburgh, Pa,. for Pittsburgh, western Pennsylvania, western Ohio, northern West Virginia and western Maryland; E. P. Blake, Boston, Mass., for Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut; A. B. King, Savannah, Ga., southeastern Georgia; Poppenberg Motor Car Co., Buffalo, N. Y., Buffalo, the western half of New York state and northwest Pennsylvania; Shawnee Motor Car Co., Topeka, Kan., Jackson and Platt counties in Missouri and the state of Kansas; Benn & Roberts, Pensacola, Fla., western Florida; Automobile Inn, Geneseo, Ill., Henry county; Pierce Brothers, Muncie, Ind., Delaware, Blackford and part of Henry counties.

Moline, Ill.—The Lewis Sales Co., of St. Louis, Mo., has been appointed agent for the Midland cars.

Boston, Mass.—The Empire Rubber Co.'s branch has moved from Devonshire street to 119 Summer street.

Columbus, O.—Kimmel Brothers, at 215 North Fourth street, have taken the agency for the Cole in addition to the Speedwell.

Kaukauna, Wis.—The Hoehne Auto Co. is now owned by Otto and Herman Hoehne who have changed the name to the Hoehne Brothers Auto Co.

Omaha, Neb.—The T. G. Northwall Co. has contracted with the new Briggs-Detroit company for the handling of the cars manufactured by that concern throughout this territory.

Indianapolis, Ind.—Recent appointments of Cole agents include: George H. Mills, Shreveport, La.; H. F. Russell, Ocean Springs, Miss., and Byron & Cunningham, Waseco, Minn.

Seattle, Wash.—With the taking over and remodeling of the quarters formerly occupied by the Eureka Motor Car Co., the Duro Motor Car Co. now has one of the largest garages in Seattle.

Columbus, O.—The Leighton & Handock Motor Truck Co. is the name of a new concern organized at 16 East Walnut street, to handle the Sternberg trucks in 1912 and operate a garage and repair shop.

Washington, D. C.—The Hudson agency has been transferred from H. B. Leary, Jr., to C. S. Storm. The latter has opened a salesroom at 1006 Fourteenth street, N. W., under the name of the Hudson Sales Agency.

Green Bay, Wis.—Announcing that the growth of motor car use and the decline of the horse has made the business decidedly unprofitable, Earnest Van Erman, for 25 years in the harness and horse goods business, has retired and is selling his stock at sacrifice prices.

Minneapolis, Minn.—The Regal Sales Co., Inc., has been organized to succeed the Regal Sales Co. with $25,000 capital. V. W. Knapp, banker at Long Lake, Minn., has bought the interest of Milton Brice. J. P. McGuire, partner with Mr. Brice, will continue as manager.

Detroit, Mich.—T. W. Henderson, son of Vice-President Thomas Henderson, of the Winton company, who has been manager of the Michigan selling branch of the Winton for the past 5 years, has resigned to engage in the manufacture of motor cycles here. He has organized the Henderson

Motorcycle Co., with a capital stock of $175,000. Frank N. Sealand, of Cleveland, will manage the Winton branch.

Denver, Colo.—The Overland Auto Co., of Denver, has placed branches at Albuquerque, N. M., and Phoenix, Ariz.

Milwaukee, Wis.—Hustis Brothers, 137 Oneida street, Milwaukee, have been appointed state agents for the Henry in Wisconsin.

Baltimore, Md.—J. S. Ditch has taken on the Baltimore agency for the Detroit electric, with headquarters at North and Mt. Royal avenues.

Cincinnati, O.—J. A. Vaughn has succeeded H. W. Farr as manager of the Cadillac Motor Sales Co. Mr. Farr has returned to his former home at Detroit.

Omaha, Neb.—The Powell Supply Co. recently moved into its new building at 2119 Farnam street. The store is 30 by 120 feet, with a 140-foot basement.

East Liverpool, O.—The Ford Auto Agency of which W. S. Seederly is manager, has taken the agency for the Ford in that county. The salesrooms are located at 126 West Fourth street.

Minneapolis, Minn.—R. A. Briggs, formerly northwestern sales manager for the Studebaker Minneapolis branch, has associated himself with the St. Paul Motor Vehicle Co., local agent for the Studebaker line.

Milwaukee, Wis.—The Stutz Motor Car Co. of Wisconsin under the management of Edwin F. Arlington, will handle the Stutz in the state of Wisconsin, having general offices in the Majestic building, Milwaukee, Wis.

Dallas, Tex.—The newly organized Cole distributing agents at Dallas, have incorporated under the name of the Henderson-Cole Motor Co. The salesrooms that were formerly occupied by the Packard at 2025-2027 Commerce street are the new Cole distributing agents' home.

Seattle, Wash.—With the establishment of permanent and spacious quarters at 1718 Broadway, the Baker electric car is now in the Seattle field. J. E. Morris, who for the past 2 years has been traveling representative for the Baker factory at Cleveland, will be the manager of the new agency.

Minneapolis, Minn.—W. V. B. Campbell, of the Northern Motor Sales Co., has taken the Minnesota territory for Marion cars. He already had the right for the western tier of counties in Wisconsin. Mr. Campbell has the Lozier agency and has removed to the former Parker garage at 45 Tenth street, S., Minneapolis.

Omaha, Neb.—The Carter company of Omaha has recently granted several new contracts for handling Carter cars in Iowa and Nebraska. F. P. Hoye will handle the car in the western part of Custer county and in Logan county. He is erecting a new garage for this purpose. The Exeter Garage and Machine Co., of Exeter, Thomas Spatts, of Osmond, and the Logan Valley Carter Car Co., of Oakland, are other dealers who will handle them.

Minneapolis, Minn.—The Yale Automobile Co., 318 Fifth avenue S., has taken the northwestern agency for the Penn.

Johnstown, N. Y.—Wells & Morse, Cole agents, have moved into new quarters and in the future will be known as the Cayadutta garage.

Cincinnati, O.—The Leyman-Buick Co., heretofore handling the Grabowsky power wagon, has taken over the sales of the Mack and Saurer trucks.

LaCrosse, Wis.—The LaCrosse Rubber Mills Co. is considering the erection of a large and modern factory building adjoining its present plant and costing $40,000.

Boston, Mass.—Contracts have just been closed by the Velie Boston branch with the Acme Motor Car Co., of Worcester, for Worcester and the southern section of Worcester county.

Portland, Ore.—Glide pleasure cars and Avery trucks are the latest motor vehicles to enter the Portland field, and will be handled by Beall & Co., who will act as Northwest distributors for these cars.

Indianapolis, Ind.—L. E. Black has become city sales manager in Indianapolis for the Stutz. He formerly was with the United Motors Indianapolis Co., having charge of that branch's wholesale department.

Tacoma, Wash.—The Tacoma branch of the Ford Motor Co. recently established new agencies as follows: Chehalis Garage Co., Aberdeen; Washington Automobile Co., Olympia, Richard Harris, Agent.

Milwaukee, Wis.—The Flanders electric makers have opened a Wisconsin branch in Milwaukee and have arranged with the Kopmeier Motor Car Co., 375-389 Summit avenue, operating the largest electric car garage and service station in the northwest, to act as Flanders service department for Wisconsin for a long term of years. The Kopmeier company continues the agency for the Detroit electric.

Quincy, Ill.—The Fischer Motor Car Co., which handles the Brush, E-M-F and Flanders, has taken on the Abbott-Detroit.

Baltimore, Md.—The agency for the Fiat in Baltimore has been established with F. C. Latrobe, Jr. He has his garage at 1010 Morton street.

Jefferson, Wis.—The Waverly Motor Co. has commenced operations in its new plant here, and the first motors will be marketed about February 1.

New London, Wis.—The Jennings Motor Car Agency has opened its display rooms and garage in the Cline block. The Cadillac, E-M-F and Flanders cars are represented.

Cincinnati, O.—The Charles H. Moore Oil Co. has established a branch in this city at Brook street and Broadway. L. W. Thompson has been selected to manage the Louisville office.

Chicago—The Simkin Mfg. Co., making the Daisy self-lighter for acetylene headlights, has been established at 1507 Michigan avenue by Walter Simkin, formerly in charge of the Rambler north side garage.

Boston, Mass.—J. J. Gormley has resigned as manager of the Boston branch of the Lozier because of ill health. He will travel looking after the retail sales in his territory. R. B. Nettleton has been appointed manager of the branch.

Toledo, O.—Plans are being made for the erection of the largest garage in Ohio in the city of Toledo. The structure will be a two-story brick with a ground space of 142 by 174 feet and will be located at the corner of Madison avenue and Twenty-second street.

Milwaukee, Wis.—The Fort Wayne Electric Co. of Fort Wayne, Ind., which some time ago absorbed the Northern Electric Co. of Madison, Wis., a large producer of electrical goods and devices, will move its general sales offices to Milwaukee on February 1. W. B. Crabtree of Madison will be manager of the Milwaukee offices.

Minneapolis, Minn.—W. A. Crowe & Sons, 1027 Hennepin avenue, have taken the Union line. The Hudson & Thurber Co., which last fall took distributing rights for the Speedwell, has consolidated the motor car department with the Donnell-Wickers Co., distributor for the Bergdoll, with headquarters in the Northern Motor Sales Co. garage.

Racine, Wis.—The Mitchell Motor Co. of Dallas, Tex., has been incorporated under the laws of Wisconsin by the officials of the Mitchell-Lewis Motor Co. of Racine. The capital stock is $5,000 and J. W. Gilson, C. A. Armstrong and G. Vernon Rogers appear as incorporators. The company will operate a branch of the Mitchell motor car interests at Dallas.

Recent Incorporations

Augusta, Me.—Union Motor Sales Co., capital stock $200,000; to do general motor car business.

Boston, Mass.—Whitney Barry Co., capital stock $100,000; to deal in motor cars; incorporators, C. F. Whitney, Newtonville, and C. H. Barney.

Bridgewater, Pa.—William H. Bassett Co., capital stock $15,000; to deal in motor cars; incorporators, C. E. McGettigan, Isaac Marks and Joseph Hibbard.

New York—Central Motor Co., capital stock $10,000; to manufacture motors and motor cars; incorporators, R. Dubecq, A. M. Beres and W. B. Burradell.

Syracuse, N. Y.—Julian Motor Co., capital stock $200,000; to manufacture and deal in motors, etc.; incorporators, J. S. Brown, G. A. Young and E. W. Lawton.

Chicago—Commercial Car Sales and Service Co., capital stock $10,000; general motor car business; incorporators, G. H. Tazler, T. McWilliams and F. A. Rinehart.

Cleveland, O.—Eckenroth Automobile Livery Co., capital stock $5,000; incorporators, R. L. Eckenroth, H. J. Eckenroth, P. L. Eckenroth, C. F. Schultz and H. Eckenroth.

Among the Makers and Dealers

DETROIT Concern Quits—The Stanley Power Wagon Co., of Detroit, has filed notice of dissolution.

McMurtry Making Horns—Alden L. McMurtry has resumed the manufacture of the McMurtry mechanical horn. Mr. McMurtry claims to be the original inventor of mechanical diaphragm signal apparatus.

Not Kissel Branch—The statement is made that the Kissel Kar Ko., of Boston, which went into a receiver's hands, has no connection whatsoever with the Kisselkar New England branch, being its predecessor in Boston.

Stephens Joins Dart Forces—Raymond Stephens has been appointed general sales manager of the Dart Mfg. Co., of Waterloo, Ia. Mr. Stephens has been connected with the Buick, Kisselkar and Lauth-Juergens companies and formerly was sales manager for the Randolph Motor Car Co., the Fidelity Motor Car Co. and the Warner Clutch Co.

Moore With Weston-Mott—D. K. Moore, vice-president and one of the organizers of the American Distributing Co., of Jackson, Mich., has accepted the position of general sales manager of the Weston-Mott Co., of Flint, Mich., and assumed entire charge of the distribution of their various products on January 1. Mr. Moore will retain his interests in the American Distributing Co.

Miller's Estate Sues Railroad—Suit has been commenced against the Chicago, Burlington and Quincy Railroad for $10,000 damages by Charles H. Pope, administrator of the estate of John E. Miller, engineer and designer for the Midland Motor Co., who was killed November 10, when his car was run down by a Burlington train but a short distance from the Midland factory.

Dealers Organize at Oshkosh—The Oshkosh Automobile Dealers' Association has been organized at Oshkosh, Wis., with the following list of officers: President, Dr. J. A. Crum; vice-president, Frederick Hoaglin; secretary, Arthur Thom; treasurer, W. F. Scoular. The new association proposes to hold a motor show during February, using the armory and another large building nearby for displays.

Tradesmen Building a Boulevard — A boulevard 4,700 feet long, along the west side of Riverside park, Indianapolis, is to be built by Carl G. Fisher, president of the Indianapolis Motor Speedway Co.; James A. Allison, secretary of the Prest-O-Lite Co., and F. H. Wheeler, of Wheeler & Schebler. The park board will donate 40 feet off the west side of the park to make the boulevard 80 feet wide and will do the necessary engineering and superintend the work, while the three men will bear the construction cost which will run from $20,000 to $25,000. The new boulevard will reach the country homes being erected by Fisher, Allison and Wheeler.

New Franklin Model—The Franklin company has brought out a little six of 30 horsepower which has a bore of 3⅝ inches and a stroke of 4 inches. In general it follows the Franklin ideas found in the other 1912 models.

Fire in Winnipeg—The Hub garage in Winnipeg, Man., was destroyed by fire January 3. The loss was about $75,000. The building was a single-story frame. A new building will be erected when the insurance is settled. It was only partly covered by insurance.

Recruit for General Motors—Henry F. James has resigned as district sales manager in Detroit for the American Cash Register Co., to take a position as promoter of sales with the General Motors Co. Mr. James was with the National Cash Register Co., of Dayton, for 20 years before joining the American forces.

Novel Enterprise — A large concrete building 60 by 40 feet has recently been completed in Portland, Ore., which is called the Automobile Laundry. Here nothing will be done except the cleaning and polishing of cars. A machine will go in at one end of the building dirty and come out at the other end with the brass work burnished, the enamel resplendent and every scrap of mud and dust removed. All this will be done at a cost of $1.50 and in the time of 15 minutes. H. T. Barnhart is the manager of the new concern.

Gutelius Midland Sales Manager—Nelson T. Gutelius, formerly of the St. Louis Post-Dispatch, has been engaged as sales and advertising manager of the Midland Motor Co. Frank B. Wood, former general executive of the Chicago Motor Club, has been appointed temporary superintendent of the East Moline plant of the Midland Motor Co. to fill the vacancy recently caused by the resignation of Henry P. Pope, superintendent of the plant for the last 3 years, and son of C. H. Pope, former president of the Midland company.

Eisemann Moves to New York—Beginning with the first of the new year the sales offices of the Eisemann Magneto Co. were transferred to the main offices at 225-227 West Fifty-seventh street, New York city, from the Detroit offices in the Ford building. The Detroit offices will be continued as branch offices as before with H. D. Wilson in charge. In addition to this the company also has opened a branch in Indianapolis at 427 Meridian street, with Lon R. Smith in charge of those offices. In place of Mr. Wilson, former sales manager, who remains in charge of the Detroit offices, A. T. Le Blanc has been appointed sales manager, with his headquarters in New York city.

Booming Indianapolis—On all Indianapolis-made cars exhibited at the New York and Chicago shows will be tags labeled "made in Indianapolis." The idea originated with the Premier people and is intended to advertise the Hoosier metropolis.

Henry Ford Has Bird Farm — Henry Ford, president of the Ford Motor Co., is putting in his spare time these days on his bird ranch, near Dearborn. In addition to providing food and shelter for the feather family, Mr. Ford went to the trouble of taking the chill off the birds' drinking water by running an electric current through it. He has discovered that the birds are now using the water to bathe in, with the mercury below zero.

Drawback on Inner Tubes—Under section 25 of the tariff act, the treasury department at Washington has made a ruling motor car tires manufactured by the Michelin Tire Co., Milltown N. J., with the use of imported metric thread valves. It is provided that the allowance of drawback shall not exceed one imported valve for each inner tube exported. The manufacturer's sworn statement, together with a sample of a section of an inner tube with the imported valve attached has been filed with the collector of customs at New York.

Show Idea in Wisconsin—The show idea is being adopted in many cities of Wisconsin and local dealers are getting together to hold local displays. At Racine, Wis., manufacturers and dealers intend to give an exposition in the big Lakeside Auditorium, a summer park exposition place. At Beloit, James W. Menhall is to give a show at which other Beloit dealers also will exhibit. Dealers at Janesville, LaCrosse, Eau Claire, Manitowoc, Sheboygan, Fond du Lac, Oshkosh, Marinette, Kenosha and other large Wisconsin cities are considering similar projects.

Recreation Room Provided—Interesting ceremonies took place at the big plant of the Willys-Overland Co., in Toledo, last week, when the new bowling alleys and gaming room donated by John N. Willys were formally presented to the employes. The presentation address was made by Mr. Willys and was suitably responded to in behalf of the employes by Edward Usher. The rooms are handsomely furnished and well equipped and include seating room for several hundred spectators. The recreation department is in the basement and is absolutely under the control of the employes.